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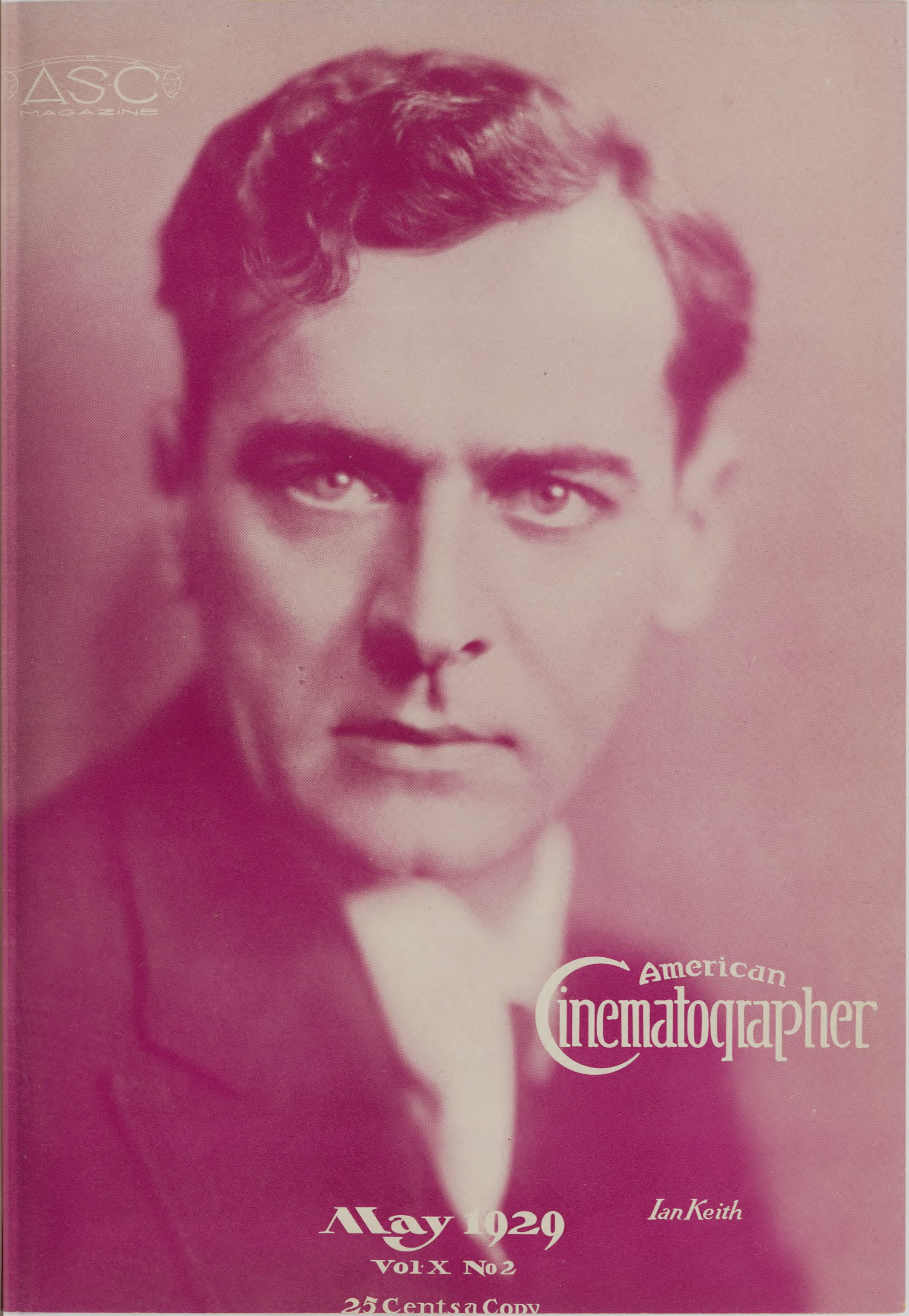

# American Cinematographer

Ian Keith

May 1929
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# AMERICAN CINEMATOGRAPHER

A technical and educational publication, espousing progress and art in motion picture photography.

Suite 1222 Guaranty Bldg. - - - - Hollywood, California

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Vol. X

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Published Monthly by THE AMERICAN SOCIETY OF CINEMATOGRAPHERS, INC., Hollywood, Calif. Established 1918. Advertising Rates on Application. Subscription: United States, $3.00 a year; Canada, $3.50 a year; Foreign, $4.00 a year; single copies 25c. Telephone GRanite 4274.

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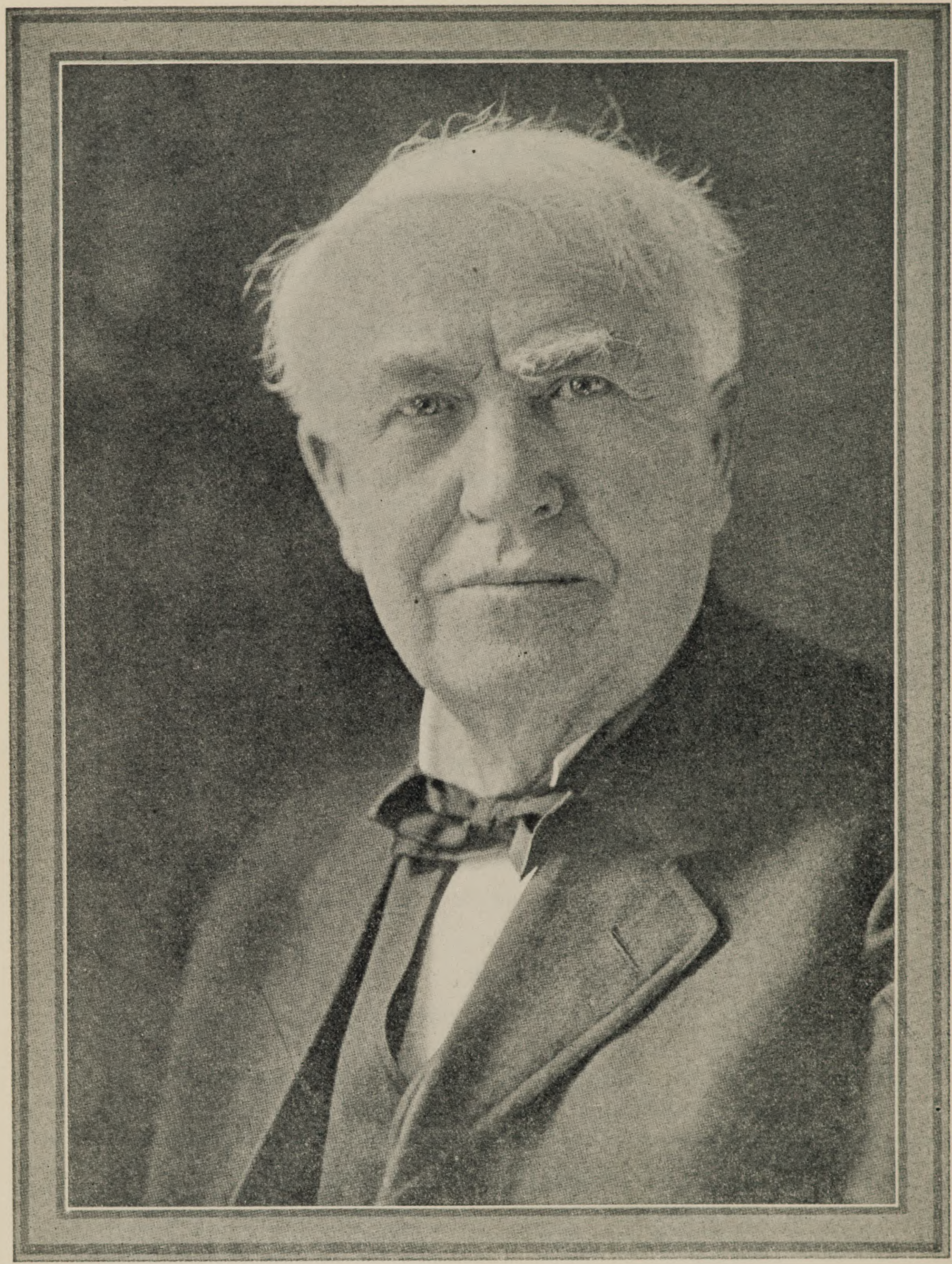


WHAT a twilight hour must be his in the knowledge that as daylight fades, millions of his lamps take up the vigil, forming the western boundary of a zone of man-made light, following in the wake of the sun as it encircles the globe and spreading half way 'round the world to meet its return in the east.

# THE GOLDEN AGE OF LIGHT SALUTES ITS FOUNDER

In this year, 1929, the nation and the world are called to celebrate the genius of Thomas A. Edison for fifty years of incandescent lighting

*By* DR. CHARLES A. EATON

This unusually interesting article by Dr. Eaton is reprinted from LIGHT, the very excellent magazine published by the National Lamp Works, Nela Park, Cleveland, Ohio, through the courtesy of its board of editors.—Editor's Note.

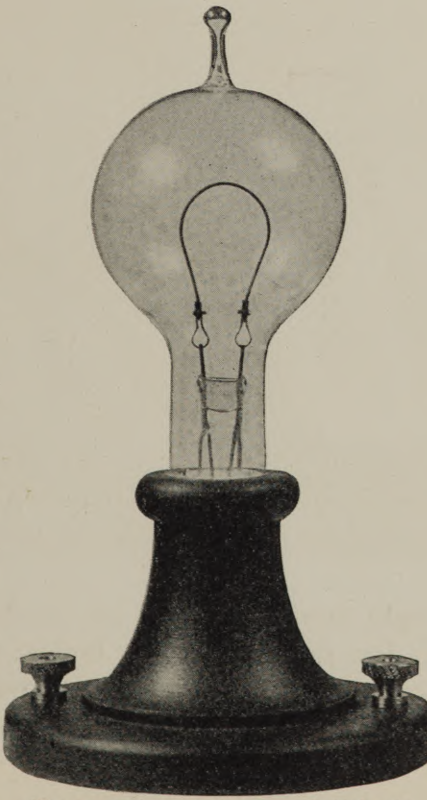
ON FEBRUARY 11, in 1847, at Milan, Ohio, Thomas A. Edison was born. On February 11, 1929, at Miami, Florida, this same Thomas A. Edison celebrated his eighty-second birthday, and a world paid its respects. This was only the start of a fitting celebration.

On October 21, 1879, just half a century ago, he invented the first practical incandescent lamp. The light we know today was born. Already in some quarters the quavering flame that has served man since he emerged from his cave is known only as a curious relic of other days. And this year, light, the light we know, enters upon its golden jubilee. The golden wedding of an envisioned dream with stolid fact will be celebrated. For fifty years now these two have gone hand in hand and the world is immeasurably enriched by their union.

To enumerate the principal accomplishments of this wonderful life would be to catalog much that every schoolboy knows. To appreciate their full significance challenges even the most adaptive imagination.

He has trapped and preserved for us beautiful sense impressions. He has banished night. He has spanned by means of thread-like, yet powerful, bridges, taut and quivering between their airy supports and humming through the frosty night, the space that separates the rushing waterfall from the homekeeper who needs its power. In a thousand ingenious ways he touches our lives at every turn.

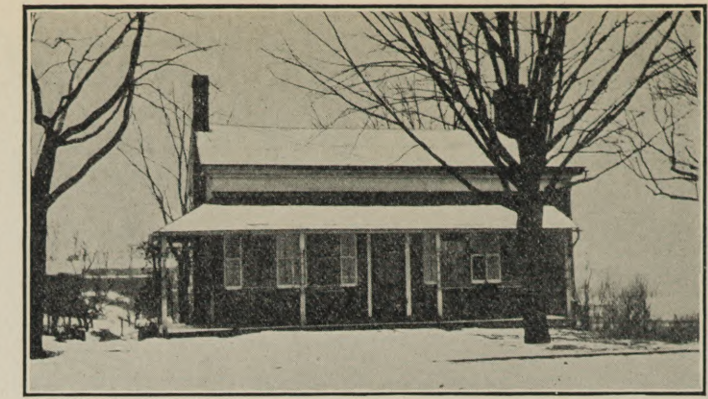
Yet, fortunately, the eulogy we voice is not an obituary. Antony of old paid glowing tribute to a departed Cæsar, reminding his hearers of enriching conquests that had been made. He reminded them of their indebtedness to Cæsar by reading his will wherein the populace was bequeathed a share in the use of his estates. Today, we pay tribute to a living Cæsar—one who has wrested from the forces of darkness and drudgery a freedom in which all mankind participates. And while we are already enjoying that rich legacy, he is still busy unearthing new treasures. Our children's children will speak with reverence of the Edison it has been our privilege to know and appreciate during our own life span. Such a Cæsar need fear no Ides of March.



The progenitor of the Age of Light developed in Edison's laboratory in 1879.

Would you be reminded of your personal indebtedness to Edison? Then take thought of every commonplace thing you do today in a way that is better and more efficient than the way in which your grandfathers did it. Trace back to its origin the modern way of doing it. And you reconstruct the road down which we have traveled—sometimes all too careless about preserving bridges behind us—and then travel over this reconstructed highway, sooner or later you will find yourself in the vicinity of Menlo Park or even a boyhood laboratory in Northern Ohio. What is commonplace today was little short of miraculous fifty years ago. It remained for a genius too big to slip into conventional grooves to bring such things about. Does such a train of thought prompt you to want to take an individual and personal part in "the greatest living tribute" to be paid this man?

No more fitting time could be chosen to honor Edison than that period lying between the date just passed, marking his eighty-second birthday, and October 21st, marking the fiftieth anniversary of the invention of his lamp. Every man, woman and child should have a part in it. But above all that industry which has become a colossal giant of service sprung from the hand and brain of this single man, will want to take a principal part in it. It is the golden jubilee of light. It is also the golden jubilee of the industry of which we are a part. Light is its appropriate agency of expression. Let the golden shafts of Light the Militant be directed triumphant against the crowding forces of darkness. Let the gentle aura of Light the Beautiful crown the temples of industry and commerce that man's ingenuity has reared. Let



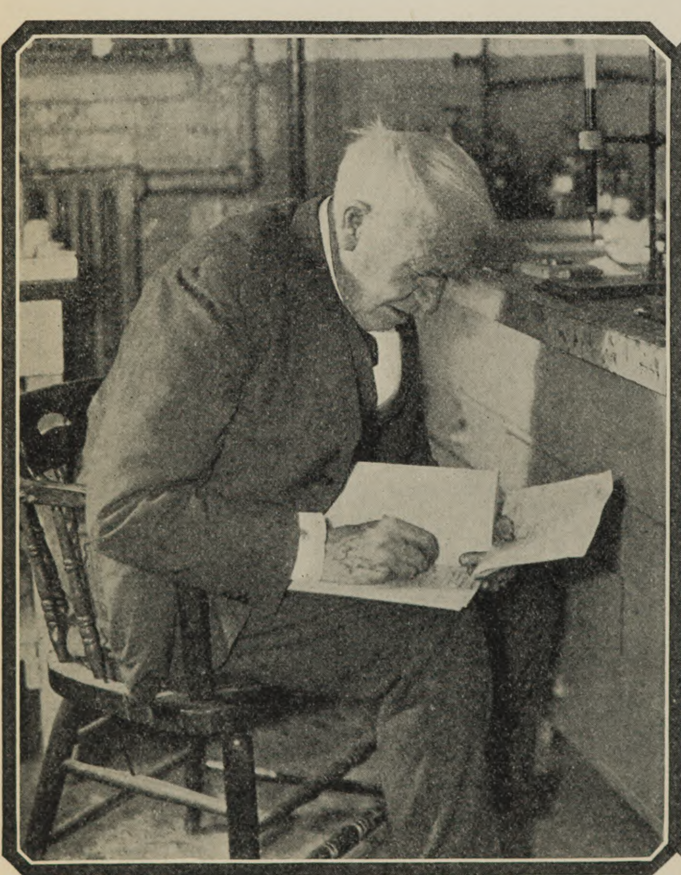
This modest dwelling on a quiet street in the village of Milan, Ohio, has become one of the famous shrines of the civilized world. It receives particular homage from Americans since it was here that their great fellow citizen, Thomas A. Edison, was born.

the spirit of Light the Benign and Helpful enter alike into mansion and hovel, into magnificent cathedral and lowly mission, into the humble wayside forge and into the steaming, clanking enclosures where leviathans of steel place at man's fingertip a thousand horses impatient to respond to his wish. Let it enter there and wherever man walks, worships, or works, unhindered in its ministering needs. Let its flaming symbolism be flung aloft where it will touch the spiritual needs of man as it has ministered to his more practical needs, quickening his pulse even as it has enlivened the tempo of his daily tasks. Let light be glorified as it never was before. This will be a fitting celebration.

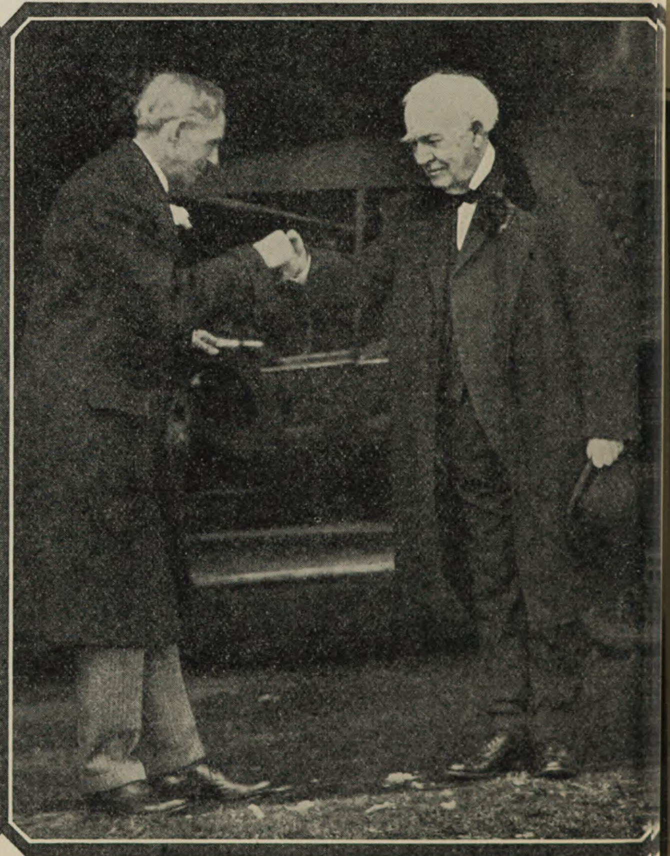
But let us not think too objectively of this celebration. It will be a wonderful tribute to a wonderful man. Subjectively it will be a wonderful thing for individuals who take a part in it and all who witness it. We need heroes to lift us above the sordid and to quicken within us the urge of neglected and forgotten ambitions. We need the practical idealism that comes from knowing a life unswervingly devoted to a high purpose. Modern "disillusions" are forced into a background by contemplation of a life so rich in the old-fashioned virtues.

Heroes we have had aplenty of the swashbuckling sort. Our printed histories show a tracery of man's conquest of man, the carving out of the destinies of nations by the sword. Generals and admirals of time-dimmed periods furnish a stimulus for our instinct to excel on the field of combat. All the great sagas of romance and adventure have from childhood thrilled us and spurred us to visualize ourselves as heroes of daring exploits. We ourselves are largely the creatures of the heroes of our younger days. But what man of any period has loomed so high above his fellows in his field of human endeavor as has Thomas Edison? Here is a hero from the world of work.

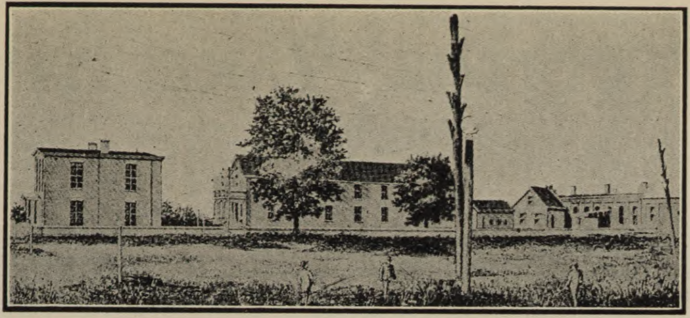
When will the mass of men learn that there is no joy worthy the name except in work—accomplishment? Idleness is merely the mirage that beckons with its illusions



The greatest living American has found work a tonic force. It has stimulated him to wonderful inventions and has preserved the vigor of his mind through advancing years.



The world's richest man, Henry Ford, has a hero—the world's greatest inventor of all times. Here we see them in a whimsical pose which bespeaks their close friendship.



Menlo Park, the birthplace of the first incandescent lamp, has become the central part of a great museum of Edisonia, which Henry Ford has collected at Dearborn, Michigan.

ae man who has not ound his work or found imself in his work—conentment with leisure, a hing to be enjoyed only the evening of a day or fe well spent. Young merica needs a hero hose way of living will mphasize these things, iddle-aged America needs take inventory of its eroes to be stimulated to g deeds yet to be accomished. Look to the life of Edison. In this way we will arn a new philosophy of work and service.

Study this life from its humble beginnings. Learn the sson of perseverance and directed effort it teaches. See ow achievement followed achievement in rapid succession nd deduce your own principles. We are paying a moral ibute to a man, but as with all true service the giving aves us the richer for having given.

He gave us many conveniences. Above all he gave us ght. What a twilight hour must be his in the knowledge at as daylight fades millions of his lamps take up the gil, forming the western boundary of a zone of manade light, followed in the wake of the sun as it encircles e globe and spreading half way 'round the world to eet its return in the east.

* * * *

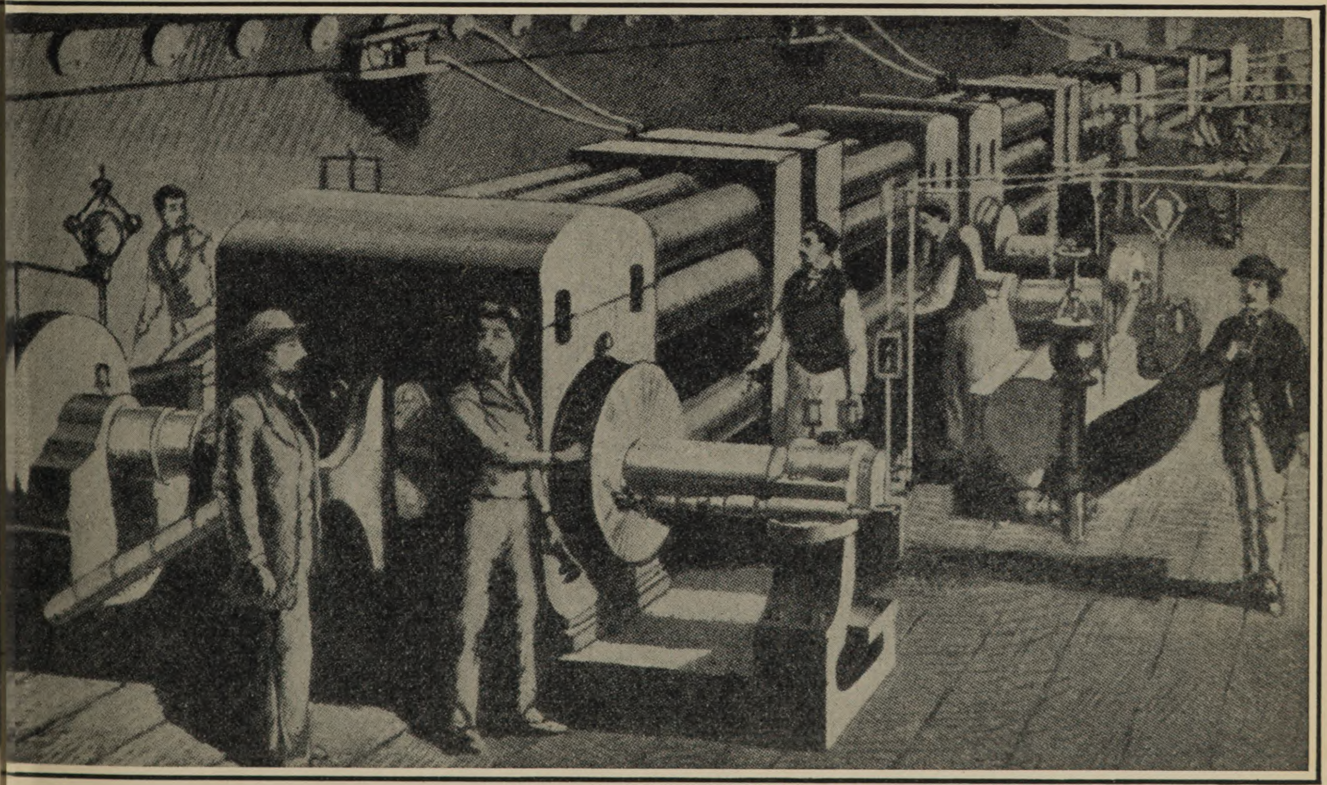
The Edison Pioneers at the annual meeting held February eleventh at the Hotel Astor, to celebrate the eighty-second birthday of Thomas Edison, unanimously approved the suggestion of a world-wide celebration to be held to honor the fiftieth anniversary of the invention of a practical incandescent lamp by Mr. Edison.

It was also announced that the celebration would culminate in a great national tribute on October 21, 1929, the date which marks the fiftieth anniversary of the production of the first incandescent lamp. The plan for the celebration was tentatively outlined in a speech by John W. Lieb, senior vice-president of the New York Edison Company and member of the executive committee of the Edison Pioneers.

Mr. Lieb said in part:

"In 1879, Thomas Alva Edison gave to the world the first practical incandescent lamp which forever freed our vision from the bondage of darkness. This year we celebrate the fiftieth anniversary of that great event and it is appropriate that that celebration take the form of a tribute to Thomas Alva Edison which is in some manner worthy to the Great Master and his outstanding achievement.

"No mind in modern times has touched at so many points the lives of so many people and so profoundly affected the welfare of mankind as Mr. Edison."



The Golden Age of Light began with the invention of the incandescent lamp. Concurrent with this invention, however, was Edison's complete development of a central station which clinched the success of the lamp. Here is shown the original central power station at Pearl street, New York City.

# A NEW EDITOR TAKES THE REINS

*WITH this issue of* THE AMERICAN CINEMATOGRAPHER *we find a new man in the chair as Editor of the magazine and general manager of the American Society of Cinematographers. He is Hal Hall, a man of wide experience in the newspaper, magazine and motion picture fields.*

*Mr. Hall takes the place of Mr. Silas Edgar Snyder, who has been in the editorial chair of* THE AMERICAN CINEMATOGRAPHER *for the past year and a half.*

*In leaving the Society Mr. Snyder takes with him the kindliest feeling of appreciation of the entire membership of the A. S. C., who wish him continued success in his new duties.*

*In securing Mr. Hall as editor, the Society feels particularly fortunate as his past experience cannot but be of infinite value to the society and the magazine. As a magazine writer, newspaper reporter, feature writer and editor, and in various phases of the motion picture field Mr. Hall has long proven his ability.*

*The new editor plans many changes in the makeup of the magazine—all of which the Society feels will make* THE AMERICAN CINEMATOGRAPHER *of still greater value and benefit to the motion picture industry. The same high quality of technical articles will not only be maintained, but will be improved. In addition, an amateur department, spoken of elsewhere in this issue, is to be added, and a more human touch will be found in stories and articles of particularly human appeal.*

*In short, the Society believes that* THE AMERICAN CINEMATOGRAPHER, *under the guiding hand of Mr. Hall, is destined to become still more outstanding in the cinematographic and technical field than ever before.*

(*Signed*) JOHN F. SEITZ,
*President, A. S. C.*

# INTRODUCING THE AMATEUR DEPT.

*FOR ten years the American Cinematographer has served the professional artists of the motion picture world, and has, in the opinion of the greatest minds of the cinematographic field, been THE outstanding magazine devoted to the advancement of cinematography.*

*Throughout these years this magazine has not only kept abreast of the times, but has usually been a step ahead.*

*Now, because of the increased demand for cinematographic knowledge, the magazine is widening its scope to include the vast field of the* AMATEUR *cinematographer.*

*Beginning with this issue, an amateur department comes into being. And in inaugurating this department we feel that we are offering something to the amateur which no other magazine can offer. This something is a service department: a question and answer department in which the amateur may have his problems solved by the master cinematographers whose skill and genius have placed American made motion pictures at the top of the world's motion picture ladder.*

*Hardly a day but what the amateur runs up against a problem. Lighting, camera angles, lens questions, how to obtain best results on a cloudy day or a day when a glaring sun beats down. What type of lamp should be used for photographing in the kitchen or the attic. Thousands of questions arise and the amateur has to turn to those in many cases who obtain their information from a book.*

*The American Cinematographer, the official publication of the American Society of Cinematographers, will answer these questions and solve these problems for its amateur subscribers. And the answers will be from the men who daily are photographing such stars as Mary Pickford, Doug Fairbanks, Ronald Colman, John Barrymore, Harold Lloyd, Al Jolson and the like. The problems will be solved for our amateurs by men who have photographed such pictures as "Noah's Ark," "The Broadway Melody," "Seventh Heaven," "Lady of the Pavements," and others.*

*"Talkies" by amateurs are now being made, and with this new development among the amateur ranks the problems will increase.*

*The entire membership of the American Society of Cinematographers will furnish the practical, professional knowledge and aid to our amateur subscribers. There is no other magazine that can offer such a service.*

*In addition to the question and answer department there will be articles of help and interest every month by men who know cinematography.*

*So, write in your problems to the editor of* THE AMERICAN CINEMATOGRAPHER *and receive really authentic answers. We aim to be of as much assistance to the amateur as we have been to the professional. The first page of questions and answers will appear in the June issue.*—[THE EDITOR.]

# THE WHY AND WHEREFORE OF THE MAZDA LAMP

*By* L. C. PORTER
Engineering Dept. Edison Lamp Works,
Harrison, N. J.

MY GOOD friend, The Editor, has asked me to write something for The American Cinematographer, and has even gone so far as to suggest that I choose my own subject—a very dangerous suggestion. Under such conditions one is likely to write about something that interests him immensely and usually that interest is due to lack of full and accurate knowledge of the subject.

**Perhaps it is for that reason that I find the American Cinematographer such a fascinating magazine. It has an individuality that makes it somehow different from the general run of technical publications, and I enjoy reading it regularly.**

L. C. Porter

I gather from the columns of this magazine that interest in Mazda lamps still continues in Hollywood. If this is so it might not be out of place to review a few of the fundamental characteristics of Mazda lamps and the principles of their most efficient utilization.

The Mazda lamps of today convert electrical energy into light in exactly the same fundamental manner as the original incandescent lamps invented by Thomas A. Edison in 1879, i. e., by passing an electric current through a filament having sufficient resistance to cause the electricity to heat it to incandescence. True, the tungsten filament gas-filled lamp of today is vastly more efficient than Edison's first carbon filament vacuum lamp. Some of the large Mazda lamps consuming ten thousand watts, that are used for motion picture studio lighting, produce 26 lumens of light for every watt of power consumed; whereas Edison's first lamp had an efficiency of only 1.7 lumens per watt. Even with this great improvement the most efficient lamps today are at best very inefficient producers of light. Of the total amount of electrical energy that goes into the lamp only about eight per cent comes out as light, the rest is converted into heat. There is, therefore, still considerable opportunity for research and development along the lines of producing a better illuminant.

It makes little difference, as far as light emission goes, whether a piece of metal is heated in a gas flame, in a coal stove, or by passing an electric current through it. After it reaches a certain temperature it begins to glow. That is commonly called "red hot." As the temperature increases the glow gets brighter and brighter until pretty soon it reaches the point called "white hot." These peculiar terms result from the fact that there is an actual color change as the temperature increases. Exactly the same thing happens with a lamp filament; operated at low temperature it emits light of a rather orange or yellow hue, as it gets hotter this color gradually becomes more and more nearly white.

The principal difference between heating a metal wire in a gas flame or in a lamp bulb from which the air has been exhausted is that in the former case the oxygen of the air will combine with the hot metal and soon cause it to burn up, whereas in the lamp bulb the metal wire or filament will continue to glow for a long time without burning up or "out," as they generally say when a lamp fails.

A lamp will not last indefinitely because, in spite of the fact that all of the air has been removed from the bulb, the surface of the filament gradually vaporizes at high temperature, causing the filament to become thinner and thinner until it finally burns in two. The higher the temperature at which the filament is operated the more rapid is the disintegration.

In the higher wattage lamps this disintegration is retarded by filling the bulb with an inert gas after the air has been pumped out. By this means the gas-filled or Mazda C lamps can be made either longer life than the vacuum or Mazda B lamps for the same light output, or what is more important, they can be operated at a higher temperature and thus emit more light for the same life, i. e., they are more efficient lamps.

In addition to emitting a whiter light as the filament temperature is increased, the relative amount of energy converted into light also increases. It is, therefore, obviously a great advantage to operate lamp filaments at high temperatures. We have, however, already seen that the higher the temperature, the more rapid the disintegration, and hence the shorter the life of the filament. The limit, of course, is the temperature at which the filament material actually melts. For tungsten this is approximately 3,475 degrees Centigrade.

In designing a lamp, therefore, we must compromise between life and light. We can secure more light at the sacrifice of life and vice versa. In general, the life of Mazda lamps is set at such a value as to produce light most economically for the service for which the lamp is intended, i. e., considering the cost of lamp renewals and the cost of current consumed by the lamps.

For general home, office, and store lighting this calls for an average life of 1,000 hours. For street railway service 1,500 hour lamps are used; for flood lighting service 800 hours, for spotlight work 200 hours; for automobile headlights 100 hours; and for projection service such as in stereopticon and motion picture projectors, 50 hours.

In some of these services, factors other than cost of current and cost of lamps also have a bearing on the design life. Take for example, a lecturer showing slides or motion pictures before a large audience. There the most essential thing is to show a good brilliant picture on the screen. The optical system of the projector limits the wattage or size of lamps that can be used. It is, therefore, necessary to operate such lamps at very high brilliancy or efficiency to secure adequate screen illumination. This inevitably means short life. Hence, the 50-hour design for the projection lamps.

In speaking of lamp life we always speak of the average life of a group of lamps, and not individual lamp life. That is because there are inherent variations in individual lamps which cause one to vary slightly from another. If we take a typical group of new lamps and start them all burning at the same time perhaps two or three of them will burn out or fail before reaching 30 per cent of their rated or average life; 5 per cent of the lamps will probably have failed by 50 per cent life; 20 per cent by 75 per cent life, and nearly 50 per cent of them will have given up the ghost before passing 100 per cent of their rated life. The remaining 50 per cent will live well beyond their normal life. Approximately 25 per cent of the original lot of lamps will still be burning at 125 per cent life; 10 per cent at 150 per cent life, and perhaps one or two at 200 per cent life. The average of the entire lot, however, will be very close to their rated life.

We have seen that life is dependent upon filament temperature. That in turn depends directly upon the voltage of the circuit on which the lamps are burned. Lamps are designed for use on various voltages, such, for example, as 110, 115 or 120, and are so labelled. Any departure from the labelled voltage has a very marked

*Concluded on Page 28*

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* * *

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WATCH FOR NEW FEARLESS PRODUCTS

# FACTORS WHICH AFFECT THE CONTRAST OF A LENS IMAGE

*By* CLIFTON TUTTLE AND
H. E. WHITE

(Communication No. 329, from the Kodak Research Laboratories. An S. M. P. E. Transaction.)

THE accurate reproduction of object contrast by the lens image is the optical desideratum in photography. To fulfil this requirement it is necessary that each area in the image shall receive light only from the corresponding area of the object. If any light other than true image-forming light falls onto the image, the contrast relations will be altered. A uniform distribution of non-image forming light over the image results in a decrease of image contrast.

In practice several factors may give rise to the presence of extraneous light: light leaks in the camera, lens flare (i. e., reflections at glass-air surfaces of the lens), reflections at metallic surfaces of diaphragm, lens mounting and camera interior, and diffusion due to foreign particles within the glass and on the surface. The first of these is avoidable by proper construction of the camera and by care in its use. The second it is impossible to avoid entirely, though by careful design of the objective its effect may be minimized. The third factor is more difficult to control and of greater magnitude than is generally supposed, but by proper precautions its effect may be reduced to negligible proportions. The fourth factor is dependent principally upon the cleanness of the lens.

## Lens Flare

The effect of lens flare upon the image contrast is small in properly designed motion picture lenses containing not more than three components. Though it may be measurable under laboratory conditions, for the great majority of practical cases it need not be considered as a serious menace to image quality. The conditions causing flare are shown in Fig. 1. It illustrates a simple lens which is forming an image of a distant object in the plane I. Light from the object is incident at the surface A. A portion (about 4 per cent) is reflected at this surface in the direction of the object. The remainder, except a very small amount lost by absorption, passes through to surface B, where a second reflection takes place. This second reflected component returning in the direction of the object suffers another reflection at surface A. The light resulting from a secondary reflection at surface A amounting to about four per cent of four per cent, or 1/625 of the original, goes to form the primary flare image at F. The image F may lie at any position with respect to I, either in front of or behind it, depending upon the curvatures of the lens surfaces and upon the refractive index of the glass. If it lies in the same plane as the image I, a flare spot results and the contrast of the image of this part of the object may be considerably affected. If it lies either close to the lens or far behind it, the flare light will be fairly well distributed over the image area. In either of these cases of uniform distribution, the maximum effect upon contrast may be computed, for at the most, 1/625 of the average image brightness will be added to the brightness of each portion of the image.

Suppose that the highest brightness of the object measures 8,000 millilamberts and that of the shadow portion is 100 millilamberts. The object contrast will be 80. If a single lens with an F 8 aperture is used, the image brightness due to true image-forming light will be about 1/100 of the object brightness; 80 and 1, respectively, for highlight and shadow. To each of these values will be added about 1/625 of the average image brightness. The average image brightness depends upon the type of picture. In seascapes or snow scenes containing a great deal of sky, the average image brightness may be nearly as great as the highlight brightness. For the usual case, however, the average will be not over twenty-five per cent of the highlight value. If an average brightness of 20 millilamberts is assumed for the foregoing case, 20/625 millilamberts will be added to image highlight and shadow. The contrast ratio then becomes 80.032/1.032=77.5. Here it is assumed that all of the flare image strikes the true image, hence the effect upon the contrast computed above will be a maximum for the assumed condition of uniform distribution. If the flare light is distributed throughout a wider angle than that subtended by the real image, as is usually the case with a well designed objective, the contrast reduction will be less.

A fairly accurate estimate of the maximum flare effect of any number of lens elements can be computed by assuming a pile of plane parallel plates separated by air instead of a number of curved surface elements with intervening air spaces. It can be shown that:

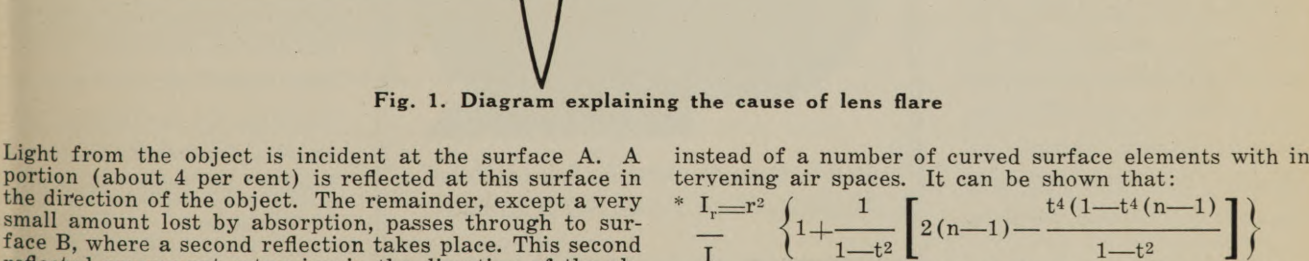


**Fig. 1. Diagram explaining the cause of lens flare**

$$* \quad \frac{I_r}{I} = r^2 \left\{1+\frac{1}{1-t^2}\left[2(n-1)-\frac{t^4(1-t^4(n-1)}{1-t^2}\right]\right\}$$

where $I_r =$ light transmitted after two surface reflections

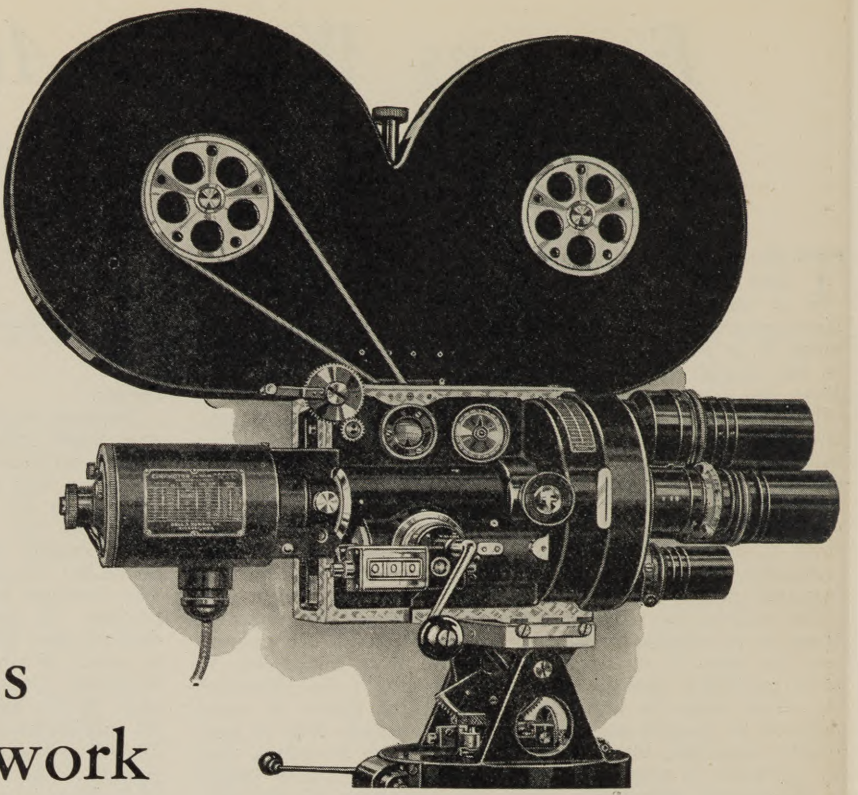
$I =$ directly transmitted light

$r = \left(\frac{u-1}{u+1}\right)^2 =$ Fresnel reflection co-efficient ($u$—refractive index)

$t = \frac{(\ 4u\ )}{(u+1)}^2 =$ transmission co-efficient

$n =$ number of plates

Substituting in this formula for various numbers of plates and assuming a refractive index of 1.5 gives the results in Table 1.**



*Bell & Howell Professional Standard Camera*

# BELL & HOWELL

## *Silent Standard Cameras*

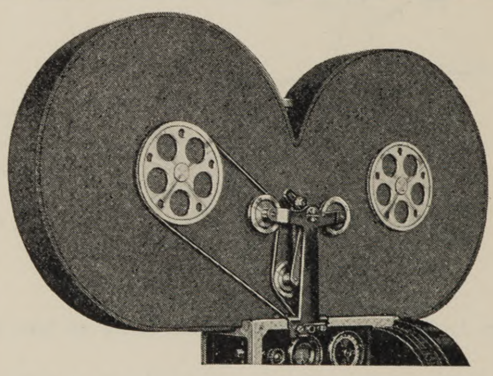
## need no booths for sound work

FULL camera freedom can be enjoyed in sound work by using Bell & Howell Sound Recording Cameras. The precision for which Bell & Howell products have been noted during twenty-two years of camera building, has produced sound recording equipment that completely eliminates all mechanical sounds.

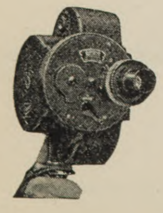
These cameras are frequently placed within eight or ten feet of the subject *without needing the protection of an interfering camera booth!*

Silencing of the camera mechanism has been accomplished by replacing steel gears with fibre gears where necessary, by the use of solid bronze bearings and by the elimination of all lost motion. Camera interiors and shutter blades have also been dampened by sound absorbing felt linings. A further feature of Bell & Howell sound recording equipment is the Sound-Proof Magazine with Silent Belt Tightener. An endless fabric belt is automatically kept at a proper tension for the uniform take-up of exposed film on rolls of any size. Complete silence of the magazines is assured by a number of holes drilled in the back and cover to interrupt sound waves, and by a complete outside covering of quarter-inch sponge rubber.

These details indicate the care with which Bell & Howell engineers have met the conditions necessary to produce sound pictures without limiting the mobility of the camera. Consultations are invited on Sound Recording Installations.



Bell & Howell 1000 ft. Sound-Proof Magazine with Silent Belt Tightener.



# BELL & HOWELL CO.

Dept. E, 1805 Larchmont Ave., Chicago, Illinois
New York, 11 West 42nd Street · · · Hollywood, 6324 Santa Monica Blvd.
London (B. & H. Co., Ltd.), 320 Regent Street · · · · · *Established 1907*

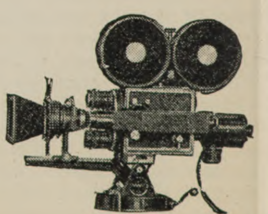


Table 1.—Ratio of re-reflected light to total transmitted light for various number of plates.

| n | F=IR/I |
|---|---|
| 1 | .0016 |
| 2 | .0093 |
| 3 | .021 |

*This formula assumes normal incidence and neglects reflected light of higher orders and optical absorption within the glasses.

**Goldberg ("Der Aufbau des Photographischen Bildes,") Enzyklopadie der Photographie (Vol. 99), has found experimentally a value considerably in excess of these computed maximums. Goldberg expressed the flare-forming characteristics of a lens as "Specific Brilliancy," which he defines as $\log_{10} I_s/I_r$. $I_r$ and $I_s$ under the described conditions of the experiment seems to correspond to our value IR and I, respectively. Stating Goldberg's value of Specific Brilliancy in terms of our value F, as used above, his data give:

| N | Specific Brilliancy | F (computed) |
|---|---|---|
| 1 | 2.2 | .0063 |
| 2 | 1.8 | .016 |
| 3 | 1.5 | .032 |

Apparently in the case of the objectives measured by Goldberg, either the flare light was concentrated about the area measured or there were present internal reflections other than those at glass air surfaces.

### Non-Image Forming Light Due to Internal Reflection Other Than Lens Flare

If the lens of the motion picture camera is unprotected by a hood or lens shade of some kind, light other than that used to project the image on the gate will enter the lens. Even if the barrel and diaphragm and the interior of the camera are carefully blackened, some portion of this unnecessary light will eventually—perhaps after several reflections—fall on the film aperture.

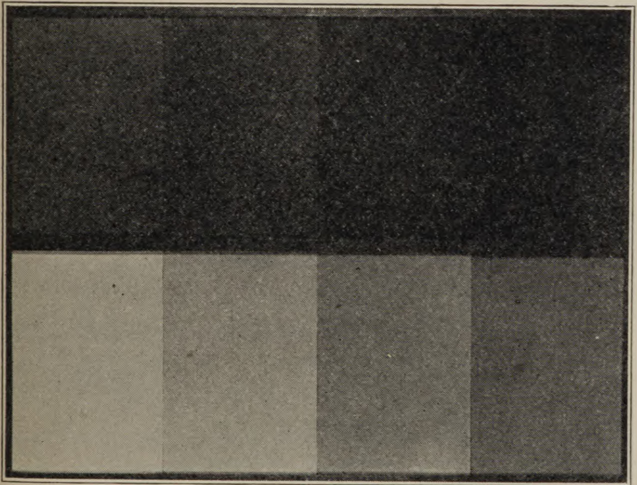


Fig. 2. Test object containing eight panels

The following experiments were tried to ascertain the magnitude of non-image forming light which occurs with the unprotected lens, and to get a practical estimate of the amount of lens flare existing in an objective of standard quality.

A set of eight neutral colored panels were prepared and mounted in a panel board (Fig. 2). These panels ranged in reflecting power .433 to .015 by approximate steps of 2.

Table 2. Photographic Reflecting Power of Panel Areas.

| Area No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | .433 | .274 | .173 | .101 | .069 | .051 | .032 | .015 |

A Bell and Howell standard camera with a three component lens of good quality was mounted in front of this panel at such a distance that the image of the panel board just filled the motion picture frame. Behind the panel board were hung successively three background drapes of different reflecting powers. The backgrounds were large in comparison to the panel board. They subtended an angle of about 100 degrees at the lens. The panel board was uniformly illuminated from the front, hence the reflecting powers of the panel areas (measured photographically) were proportional to their brightness.

The test object was photographed using four different lens stops changing the background in each case to alter the amount of unnecessary light which entered the lens. In order to detect the presence of flare spots, the arrangement of areas within the panel board was systematically altered so that each test area occupied consecutively all of the eight different positions.

By sensitometric methods it is possible to determine the brightness of an image resulting in a given negative density. The developed images were measured on a densitometer and subsequently the data were recorded in terms of brightness. A typical set of data are given in Table 3.

Table 3. Relative Brightness of Test Object Images (Lens at F 32).

| Area No. | | | | | | | | Ratio of Peripheral Brightness to Average |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Object Brightness |
| .603 | .390 | .246 | .156 | .117 | .102 | .078 | .061 | 7 |
| .597 | .367 | .235 | .139 | .096 | .077 | .057 | .042 | 1 |
| .586 | .351 | .222 | .128 | .082 | .065 | .042 | .024 | .25 |

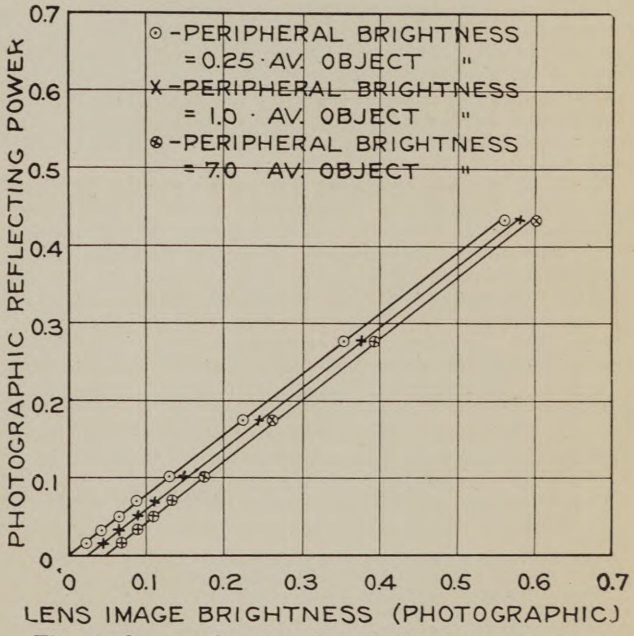


Fig. 3. Curves showing the relation between object and image brightness

The only variable in this set of data was the peripheral background brightness. Since none of this area was included within the film image any difference must be due to reflected peripheral light striking the film. That there is a great difference in contrast may be seen at once by comparing the ratios of highest to lowest brightness in the three cases: $\frac{.603}{.061}=10.1$; $\frac{.597}{.042}=14.2$; $\frac{.586}{.024}=24.2$.

In the last case, where a black peripheral background was used, the image contrast approaches close to that of the object. Obviously, light from areas surrounding the true image can seriously affect contrast. A graphical representation obtained by plotting the data of Table 3 against the photographic reflecting power (Table 2) is shown in Fig. 3. Here it can be seen that the addition of non-image forming light takes place rather uniformly over the entire frame. Since it is a uniform effect, the intercepts of these curves on the image brightness axis are indicative of the amount of non-image forming light. The intercept is the amount of veiling light which would be present over the image of a perfectly black object.

The intercepts of all sets (180) were found by least square method. The agreement between similiar sets is exceptionally good considering the numerous possibilities

*Continued on Page 22*

# S. M. P. E. MEETING IN NEW YORK

## Record attendance expected at annual Spring meeting—Sound to be big feature—Twenty-seven papers to be read

As this issue of the American Cinematographer goes to press final details are being completed for the Spring meeting of the Society of Motion Picture Engineers, which will be held in New York City, May 6th to 9th. Advance information indicates that this meeting will be the largest ever held by the society.

Heretofore the meetings have been held in Boston, Washington, Norfolk, Virginia, Lake Placid, Hollywood, Rochester, etc. Some of these cities were difficult for some members to reach and necessarily limited the attendance. This year, however, a record attendance is expected. Headquarters will be at the Park Central Hotel.

The introduction of sound into the motion picture field undoubtedly has done much to increase the interest in the technical departments of the motion picture industry, and has greatly increased the realization of the importance of the technical work.

That sound will play a big part in the Spring meeting is evidenced by the part that eleven papers dealing with sound have been scheduled to be read. A total of twenty-seven papers will be read before the meeting.

W. C. Kunzman, National Carbon Company, is Chairman of the Convention Committee, which is as follows: Reception: W. C. Hubbard, H. T. Cowling, M. W. Palmer, W. C. Kunzman; Registration: Kenneth Hickman, W. C. Kunzman; Hostess: Mrs. L. C. Porter (assisted by Mrs. Palmer); Banquet: W. C. Hubbard; Master of Ceremonies Banquet: J. I. Crabtree; Sound Equipment: R. V. Terry, Bell Telephone Laboratories; Projection: Harry Rubin, Publix Theatres; Entertainment and Amusements: D. and A., Bulletins and Transportation and Press: P. A. McGuire; Studio Demonstrations; Dr. A. N. Goldsmith, R. C. A. Phototone, Inc.; Official Photographers: H. T. Cowling, Irl Gordon; Announcements: C. E. Milliken. J. W. Coffman is chairman of the committee.

The following papers have been tentatively scheduled to be read before the meeting:

1. The Universal-base sound film projector
Mr. H. Pfannestiehl of Bell Laboratories, Inc.
2. Some Properties of Fixing Baths—
Mr. J. I. Crabtree
3. A New Screen for Sound Film Presentation—"Da-Tone"
DaTone Screen Company
4. Need for Improvement in Projection Equipment and Maintenance
Mr. F. H. Richardson
5. A New Wax-Recorder for Sound-Film Production.
Mr. L. A. Elmer—Bell Laboratories.
6. Re-recording: its importance and its problems.
Mr. K. F. Morgan—Electrical Research Products, Inc.
7. Motion-Picture Theatre Architecture—(Architect to be selected.)
8. The Universal Camera Crane—Paper and illustrative motion pictures—
Universal Film Company.
9. Sound-proofing the Camera.
Roy Hunt—P. F. L.—West Coast.
10. A typical Sound Studio Recording Installation.
Research Products, Inc.
11. Volume Levels in Theatres.
H. B. Santee, Electrical Research Products, Inc.
12. Some Typical Problems in Process Photography—illustrated by film.—Carroll Dunning.
13. The Camera Battery—
Mr. Karl Struss
14. Studio Economics
Harry Goetz—Comptroller—P. F. L.
15. Public Announcement and reinforcement system for Theatres—
Electrical Research Products, Inc.
16. Engineering Problems in set construction
Cedric Gibbons, Art Director, United Artists.
17. Sound-film Direction—
W. M. DeMille
18. Television Demonstration—
Dr. Ives—Bell Laboratories
19. Lighting equipment for sound photography—
Mr. Peter Mole
20. Improvements in incandescent lamp manufacture—
Mr. Farnham.
21. Technique of Sound Film Editing—
Hal Kern, United Artists, Editor-in-Chief.
22. Patent Problems in Business—
F. T. Woodward, Electrical Research Products, Inc.
23. Characteristics of emulsions used for recording—
Emory Huse—Eastman Kodak Company
24. Sound-Film Sensitometry.
A. K. Aster, Bell Telephone Laboratories, Inc.
25. Developing Developments—
Joe W. Coffman
26. The results of the experiment in Eastman Classroom films.
Dr. T. E. Finegan
27. Motion Picture Problems in the Army—
Major Walter E. Prosser, U. S. Signal Corps

### MONDAY, MAY 6

10:00 A. M. Organization meeting, Park Central. Committee reports. Convention business.
1:00-2:00 P. M. Luncheon, Park Central.
2:00-5:00 P. M. Program—papers of general interest, not requiring projection equipment.
8:30 P. M. Park Central roof. Pre-view of forthcoming sound-film productions. Informal dancing.

### TUESDAY, MAY 7

9:30 A. M. Special busses leave Park Central for Bell Laboratories.
10:00 A. M. Bell Laboratories Auditorium. Program devoted to papers and demonstrations of late developments in sound film production and projection apparatus.
1:00-2:00 P. M. Luncheon, Bell Laboratories Cafeteria.
2:00 P. M. Demonstration of interesting research apparatus and sound film equipment—Bell Laboratories Auditorium.
2:45 P. M. Program—More papers and demonstrations of the same type as outlined for morning session.
4:45 P. M. Television demonstration.
5:30 P. M. Busses leave Bell Laboratories for Park Central. Tuesday evening—free

### WEDNESDAY, MAY 8

9:30 A. M. Special busses leave Park Central for R. C. A. Photophone Projection room, 411 5th Avenue.
10:00 A. M. Program devoted to papers and demonstrations of variable-area methods of recording and projection.
1:00 P. M. Luncheon.
2:00-5:30 P. M. Continuation of program. Possibly to be held at Photophone 138th Street Studios.
5:30 P. M. Busses leave for Park Central.
7:30 P. M. Banquet, Park Central roof, J. A. Crabtree, Toastmaster. S. P. Grace, Vice-President Bell Telephone Laboratories, will demonstrate the possibilities, humorous and otherwise, of inverted speech transmission and reception. Dancing afterward to music from Park Central orchestra.

### THURSDAY, MAY 9

9:30 A. M. Busses leave Park Central for Paramount-Famous Lasky Studios, Astoria, L. I.
10:15 A. M. P. F. L. Projection room—program devoted to papers and demonstrations dealing with production problems.
1:00-2:00 P. M. Luncheon—P. F. L. Cafeteria.
2:00-3:30 P. M. Interesting points from papers presented by absentees. Round table discussion of motion picture engineering problems.
3:30-4:30 P. M. Open forum—general business.
4:30-5:30 P. M. Inspection of P. F. L. Studios.
5:30 P. M. Busses leave studios for Park Central.
8:30 P. M. Bell Laboratories Auditorium. Popular program of newly-organized Acoustic Society of America.

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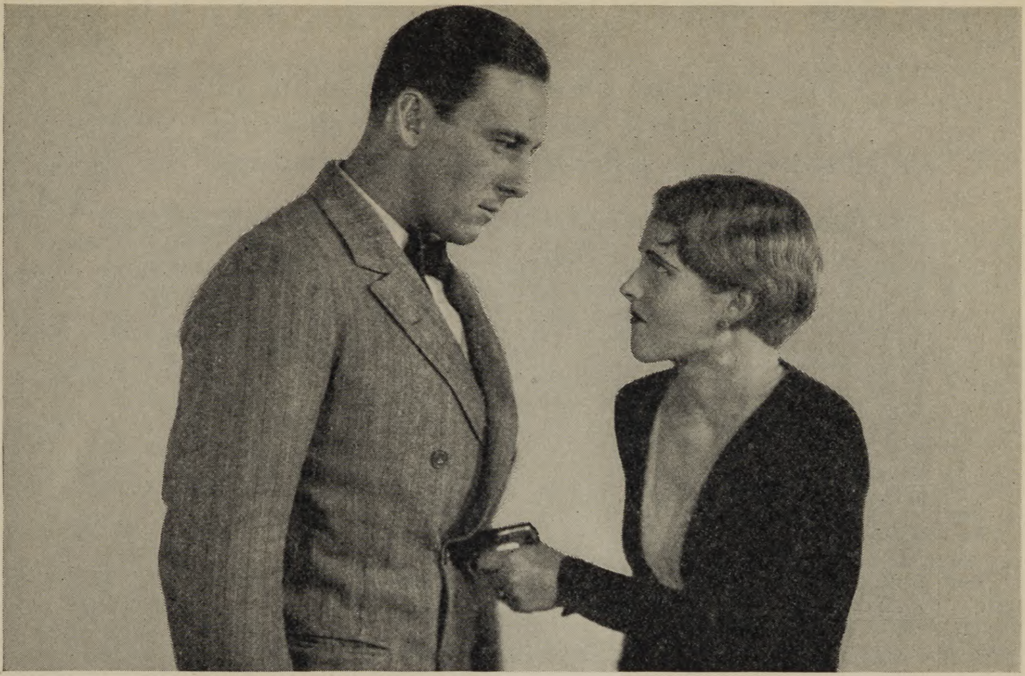
# *Our Technical Editor Talks to Chicago Cinema Club*

Joseph A. Dubray, technical editor of the **American Cinematographer**, recently gave an interesting and instructive talk before the Chicago Cinema Club. His remarks had to do with new methods of making enlargements from 16 mm. film.

A practical demonstration illustrating the methods proved of great benefit to the amateurs present. Mr. Dubray is an interesting speaker, and has represented the American Society of Cinematographers at many conventions and before many learned bodies of scientific men. He is now director of technical service for the Bell & Howell organization in Chicago.

Mr. E. A. Reeve of the Bell & Howell Company also addressed the Chicago Club. He related his movie experiences in shooting Colorado scenics.



*Lois Moran and George O'Brien in "Blindfold." A William Fox production.*

# GUNNING FOR OLD MAN WASTE

ELECTRICAL energy makes light—it also makes heat. Electrical energy is concentrated and intensified at the tips of National Photographic Carbons. A large percentage of power is utilized in these carbons to produce strong, penetrating light. Heat waste is minimized. Power costs reduced. Concentration prevents heat from diffusing rapidly into the surrounding atmosphere. *This means that National Photographic Carbons burn cooler because they transform electrical energy into light with a minimum development of heat.* That's why these carbons give more light per watt! Check up any production that's being shot. You'll find National Photographic Carbons are using less current per candle-power than any other form of studio lighting.

If you want pure sunlight put National White Flame Photographic Carbons (hard-arc) in your lamps—unbeatable for spots, long shots, or night work.

For color photography or close-ups where soft light is required use National Panchromatic Carbons (soft-arc). They're rich in red, orange and yellow-green rays. Remember that all National Photographic Carbons give more light—they guard your expense account like a new supervisor on his first job!

## NATIONAL PHOTOGRAPHIC CARBONS

*White Flame and Panchromatic*

NATIONAL CARBON COMPANY, INC.
*Carbon Sales Division,* Cleveland, Ohio
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***Branch Sales Offices:*** **Jersey City, N. J.; Pittsburgh, Pa.; Chicago, Ill.; Birmingham, Ala.; San Francisco, Calif.**

# CRANE MECHANICAL MARVEL

### Most amazing photographic device in history of picture making used in "shooting" Universal's super-production "Broadway"

The filming of a successful photoplay calls for mechanical skill of the highest order, not only in the picture itself, but in equipment used in conjunction with it. This equipment the public seldom sees, the effects only being shown on the screen, but without such equipment the photoplay could not possibly be the finished product exhibited in theatres today.

A notable example of elaborate equipment used in the production of a motion picture is the huge camera "crane" used by Director Dr. Paul Fejos in the Universal all-talking super-picturization of "Broadway," and used by Hal Mohr, A. S. C., who photographed this picture. This "crane" was invented by Dr. Fejos especially for the picture and was built entirely in the plants of the Consolidated Steel Corporation, Los Angeles.

When the direction of both silent and sound versions of "Broadway" was assigned to him, Dr. Fejos determined to dramatize the "personality" of the huge Paradise Night Club set by getting photographic effects of its dazzlingly modernistic treatment never before brought to the screen.

He conceived the idea of a huge camera crane that would operate silently and with great speed: a crane that could be used almost as though it were made of elastic rubber. After several conferences with Mohr and Chief Electrician Graves and the Universal executives, he gave the idea over to the engineers of the Consolidated Steel Corporation. They developed the idea and the result was a machine which performs in a manner almost unbelievable.

In appearance the crane is a huge steel girder, 31 feet long of latticed steel, mounted upon a 14-foot cylindrical steel turret which in turn is mounted upon a six-wheeled truck chassis. At the extreme end of the girder the camera platform is mounted—a round, cagelike turntable, upon which are all controls. The complete device is driven electrically by a specially built battery of generators, weighs 28 tons, and cost $35,000 to build.

In operation this crane can achieve a complete and independent movement of its every component part, all simultaneously. The truck chassis can be moved forwards, backwards, or in any direction upon the ground, at any speed up to 25 miles an hour. The girder can be swung up or down at a rate of 300 feet a minute or horizontally in either direction, at a speed of 600 feet a minute; and the camera platform can be spun like a top. Inasmuch as all of these operations can be conducted at the same time while the camera records everything it sees, the photographic effects are indescribable.

Behind his camera on the platform, the cameraman, says Mohr, "can film effects equivalent to those which might be obtained on a particularly thrilling roller coaster and an airplane doing a barrel-roll simultaneously. Or, swung vertically in a complete arc of 180 degrees, he may at the same time revolve the platform 100 times a minute—all the while grinding his crank industriously. Extended upright, the girder is 50 feet from the ground, and it may be swooped down in two seconds."

Mounted upon the back of the truck chassis is the control-box, in which are placed switches actuating every movement of the entire crane, governed by the controls on the platform. Belts of cable over pulleys at the front and rear ends of the girder make even the slightest jar impossible. Four separate motors, contacted through automatic commutators, supply the energy for the various movements. The chassis brakes are supplied by other motors, upon which a reverse electrical load is instantly thrown whenever the main motors are cut off.

An automobile type truck gearshaft is used in propelling the crane, six speeds forward and one reverse being used. With the low forward speed, and caterpillar treads, the crane could be made the "stunt" equal of a wartime tank, even with the heavy girder attached.

The crane was used throughout those sequences of "Broadway," which were taken in the Paradise Night Club set, its swift movement being particularly valuable during the elaborate revue numbers when a chorus of thirty girls was used. It was possible not only to follow the action of the marvelously effective ensemble as the girls advanced to the foreground in the dance numbers, but at the same time to "zoom" upward and outward so that they were being photographed from all possible angles at the same time, without a break in the film.

This crane is so silent in action that it was used with perfect safety in the all-dialogue version of "Broadway" with the same ease with which it was used in the silent version.

It is of interest to record that when Dr. Fejos' idea and rough plans were first submitted to officials of Consolidated Steel Corporation, and an outline given of the stringent requirements the "crane" must meet, it was frankly declared an impossibility to create such a unit. In all the history of mechanical and electrical engineering there never had been such a contrivance. Its very impossibility, however, intrigued the imaginations of the corporation's experts, but it was not until after several weeks' close study of the problem presented, a study in which the head of every department in the huge steel organization took a part, that Consolidated Steel finally undertook the contract.

That the completed result outstripped the most sanguine expectations of both planners and builders is not only a striking testimony to the talents and resources of the steel corporation, but is also speaks highly for the spirit of close co-operation in which both steel and studio executives worked.

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## *New Motion Picture Film Will Tell Story of Alloy Steels*

Work on the production of an educational motion picture film which will tell the story of alloy steels has been commenced by the Department of Commerce, through the United States Bureau of Mines. The film is being prepared in co-operation with one of the large alloy steel manufacturing concerns, which has appropriated a sum of $10,000 to meet the costs of production. Every step in the manufacture of alloy steels, whose remarkable hardness and durability have greatly advanced the progress of the manufacture of great numbers of useful products, will be visualized in the making of the film. The many and varied uses to which alloy steels are put will also be illustrated. The film is being made with a view to instructing the engineer and engineering student, while at the same time making the story of alloy steels perfectly plain to the layman.

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## *Benoit Signs with French Co.*

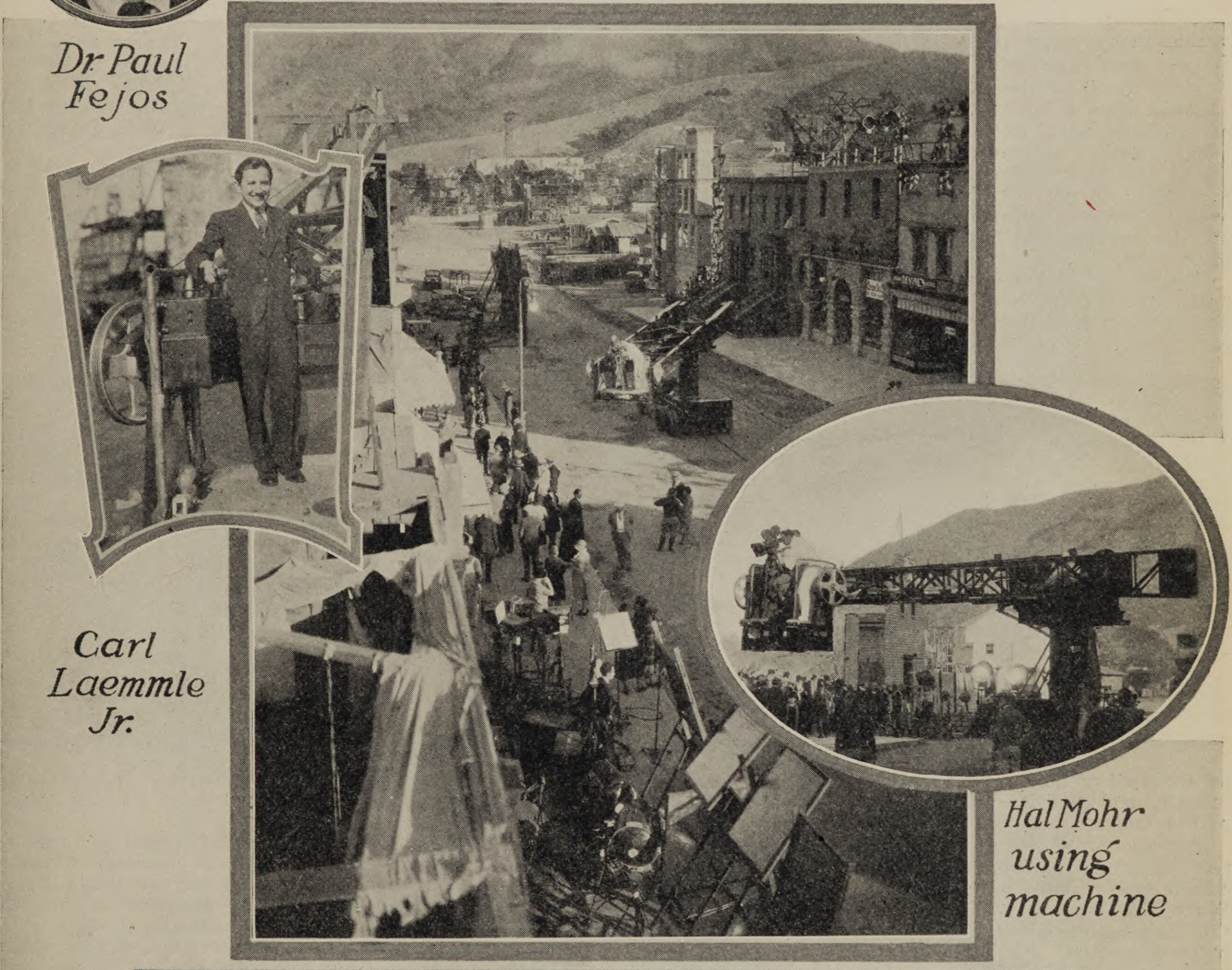
George Benoit, A. S. C., who is now in France, has just signed a one-year contract with Les Films Historiques and his first production under the new contract starts this week.

Mr. Benoit's first picture made in France was released several weeks ago and is still making a big hit on the Grands Boulevards. The picture is "Le Capitaine Fracasse," and required seven and a half months in production.

# *It Does Everything But Talk!*

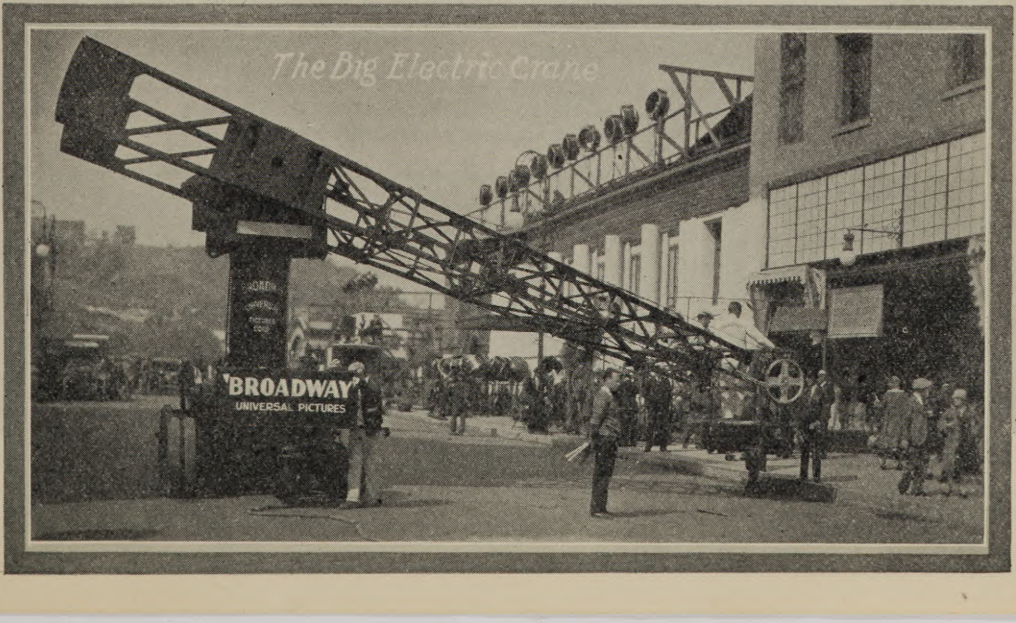
*A few intimate shots of the Camera Crane, invented by Dr. Paul Fejos, and used by Hal Mohr, A.S.C. in photographing Universal's "Broadway." This Crane was designed and built by the Consolidated Steel Corporation.*

Dr Paul Fejos



Carl Laemmle Jr.

Hal Mohr using machine



John Corydon Hill

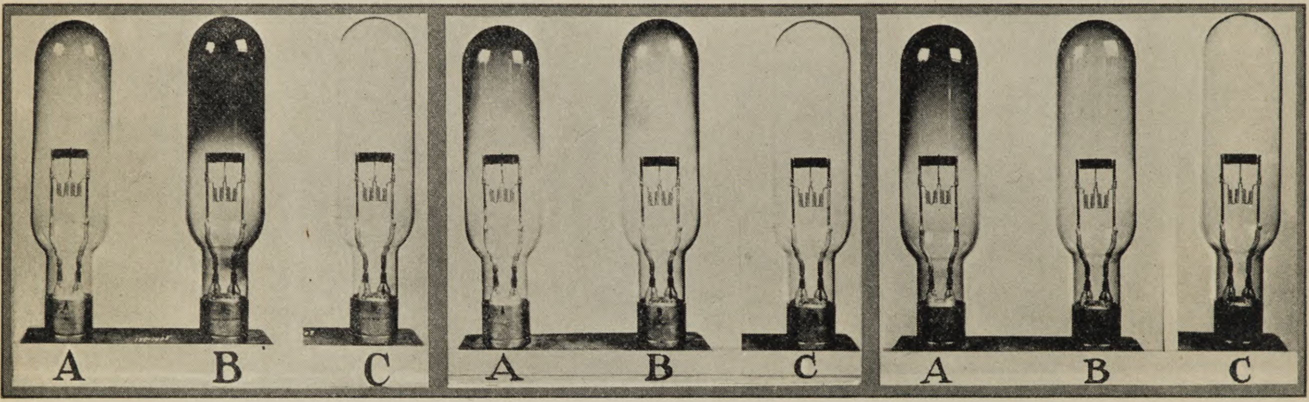
# MAZDA LAMPS WITH BULB CLEANERS A NEW DEVELOPMENT

*By* R. E. FARNUM, *Engineering Department, National Lamp Works of G. E. Co.*

**R. E. Farnum**

INCANDESCENT lamp performance is of particular interest to all cinematographers, since much of the success of their efforts depends upon a known and constant amount of available light Recent developments have made possible outstanding improvements in the 5- and 10-kw. MAZDA lamps that result in a 25 to 30 per cent increase in their light output, better maintenance of this light output during life, and less sagging of the filament coils.

Blackening and its effect in heating the bulbs, has long been a limiting factor in the design of the high wattage lamps. If we could get rid of the blackening, the filaments could be operated at higher temperatures producing more light initially and maintaining the output throughout the life of the lamps.



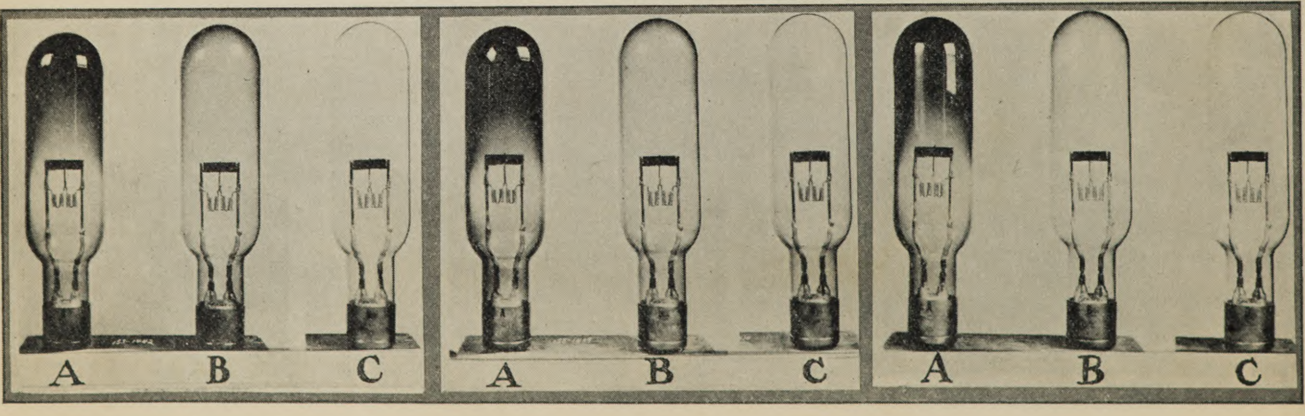
During the operation of an incandescent lamp, tungsten is slowly evaporated from the filament and is deposited on the inside of the bulb where it appears as blackening. When this evaporation has continued to a point where the filament has become sufficiently weakened or reduced in cross-section, the lamp fails. In the case of lamps used for general lighting service, the bulb surface is relatively large in relation to the wattage, and hence the bulb blackening is not so marked. High wattage lamps used for motion picture photography have bulbs that are materially smaller in relation to wattage than do the smaller sizes, and hence bulb blackening and its effects have been the limiting factor in their design and performance.

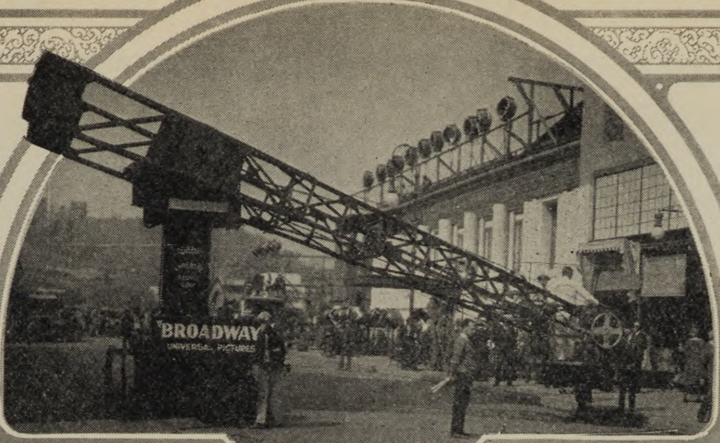
D. K. Wright, one of the engineers at the Nela Park Laboratories, has recently developed a simple, yet most effective, method of cleaning the blackening from the inside of the bulb. As a result of his ingenious work the motion picture studios not only gain about 30 per cent of the initial light output of equipments using these lamps, and besides, the losses due to bulb blackening heretofore suffered have been practically eliminated. His work will be worth many, many thousands of dollars to the motion picture studios.

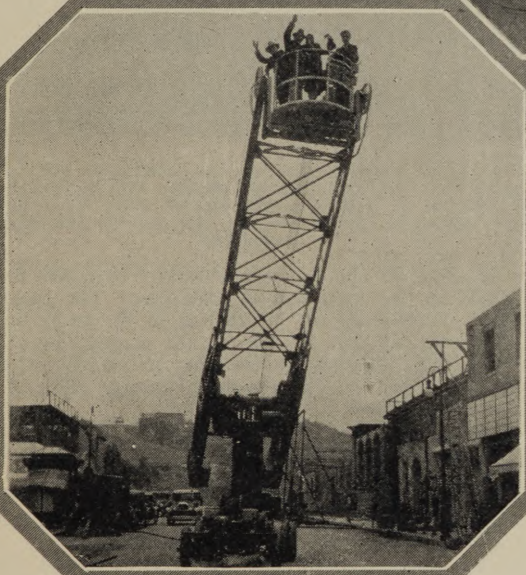
The solution of this bulb blackening problem was obtained by enclosing in the bulb a specially prepared coarse tungsten powder. After twenty or thirty hours' burning, when the bulb has become appreciably dark, the lamp is held by its neck near the base and given a whirling motion with the result that the cleaning powder scours the interior of the bulb and removes all of the bulb blackening. This is repeated at intervals during the life

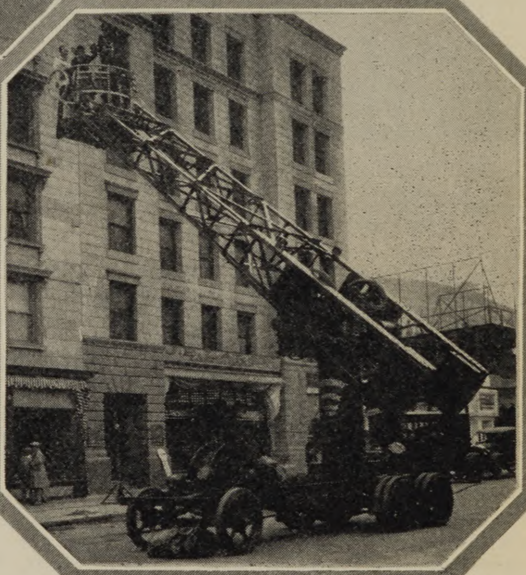
*Continued on Page 30*

**Lamps "A," reading left to right, starting with upper row, shown after successive 25-hour periods of burning. Lamp "B," poor lamp and lamp "C," same poor lamp after being cleaned following these burnings. Note how poor lamp is cleaned it appears almost like a new one.**









# Again Science Conquers!

IN the lexicon of the movie studio there is no such word as "impossible." Film producers have a habit of conceiving miracles...and of creating them!

Yet in all the history of mechanical attainment in motion picture production, nothing so daring had been attempted as the marvelous electric camera crane now the property of Universal Pictures Corporation. To Director Dr. Paul Fejos goes the credit for its conception.

But without the knowledge of Consolidated Steel Corporation engineers and the resources of the corporation in men and materials, the conception would have remained a dream.

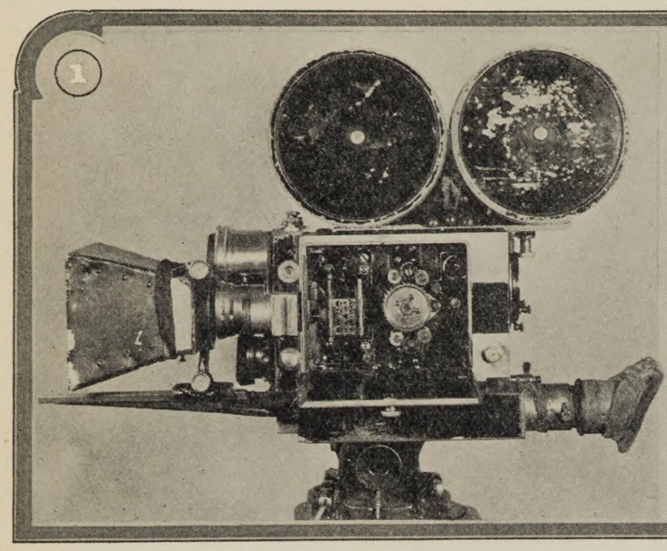
Technicians of both studio and steel organization worked in harmony in the production of this mechanical marvel. The result has astounded even its creators, for with it camera effects can be obtained which before were unknown.

**CONSOLIDATED STEEL CORPORATION**

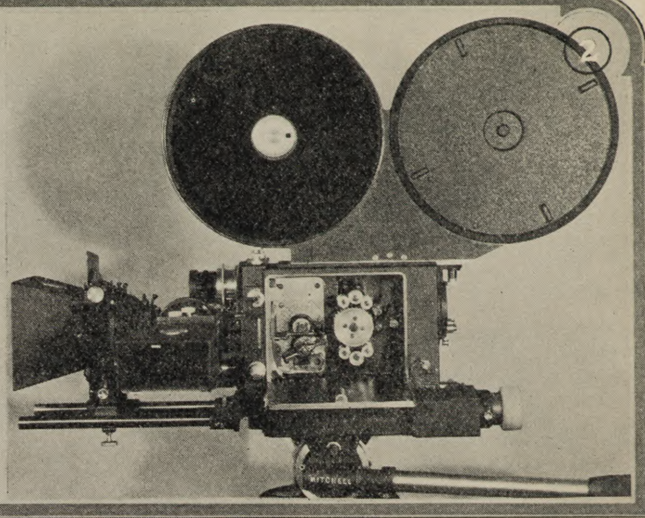
CSC

**LOS ANGELES** **CALIFORNIA**

# TAKING THE CLICK OUT OF CAMERAS



An intimate shot of the camera movement that produces the clicking which is now so obnoxious in the taking of talking pictures. In the new movement of the Mitchell camera, a piston arrangement and fibre gears preclude the clicking.



Revealing the movement in the new silent Mitchell camera. A piston arrangement has precluded the clicking that is incident to the operation of the old style of camera that is employed in photographing silent pictures. Fibre gears are also used in this part of the mechanism.

With the growing popularity of talking pictures, silence has become proverbially golden in motion picture studios and, as a result, there has come about a re-adaptation of the professional cinematographic camera.

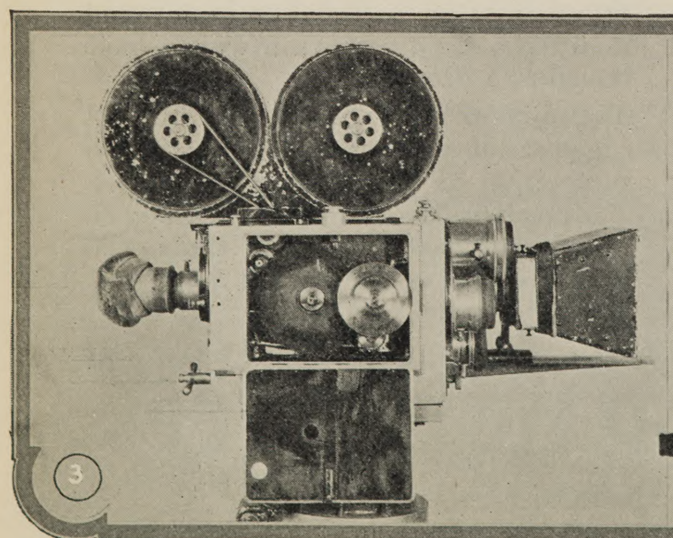
First attempts at talking pictures were attended by ponderous arrangements wherein the camera was enclosed in a sound-proof booth in which the cinematographer sweated and smothered until the completion of a given scene.

This awkardness has been precluded to a great degree through the revamping of the professional motion picture camera. In the Mitchell outfit no two metal gears are permitted to work against each other. On the contrary, metal gears are set against Bakelite gears, thus avoiding noise that, in the past, produced the venerable "click" of film cameras.

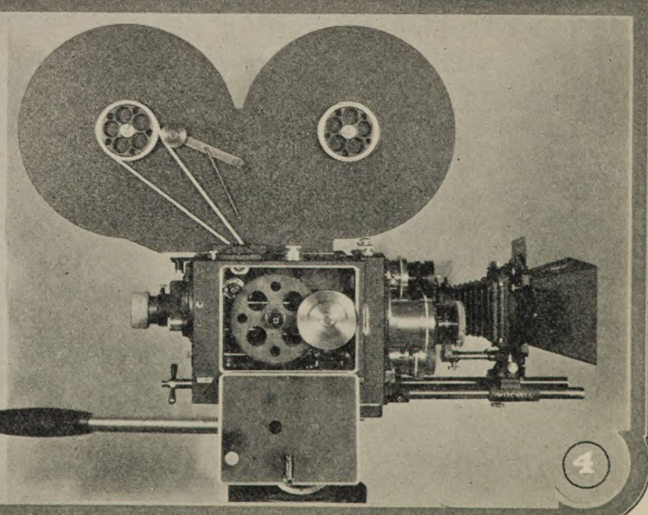
In addition, the Mitchell organization has taken out ball bearings wherever possible. Thousand-foot magazines, instead of the former standard of 400 feet, are employed on the new sound cameras. The reason for the larger magazines, of course, is to do away with frequent changes of film on the sound stages. In other respects the Mitchell camera remains practically the same, the standard high-speed movement being utilized in the sound as well as the former models.

Instead of the metal spring take-up belt as used on older models, a cloth belt is stocked on the sound cameras. The sound cameras are motor driven.

Results have been so successful that at the RKO studios in Hollywood, where the RCA Photophone system is being used to film and record Radio Pictures, no camera booths are being employed. The cameras are operated practically in the open, with screens being utilized occasionally to deflect the voices of people speaking on the sets. Two motors operate the camera and the recording apparatus, respectively. These motors are synchronized.



Here is a close-up of the gear system on a Mitchell camera that is used for silent pictures. There is no fibre gear system as on the new silent sound cameras. The belt which operates the pulley on the magazine is a metal spring. On the new sound cameras this belt is made of cloth.



Close-up of the gear system on the new Mitchell sound camera. The principal gears are made of fibre instead of metal. No two metal gears touch each other under this arrangement. Operation noises are thereby eliminated. Note the cloth take-up belt connecting with the pulley on the magazine.

# CINO-SPECTROMETER DESIGNED BY HOLLYWOOD ELECTRICAL ENGINEER

## Detailed explanation by the inventor of the construction, uses and method of using a device designed for the purpose of reading and analyzing light

*By* R. E. NORMAN, *Electrical Engineer with the Otto K. Oleson Co.*

[Mr. Norman's application for a patent on this device has been filed at Washington. The inventor declares that this invention will remove all guesswork and the danger of human error from the light end of motion picture photography. Rather than attempt to write about this ourselves we asked Mr. Norman to write it himself. The article will be in two installments.]

I HAVE designated my invention as a cino-spectrometer and have perfected the method of using and applying same in the theatrical, photographic and motion picture industry; in the taking of any kind of photographs, developing the negatives, printing the positives and in the showing of pictures in theatres.

My cino-spectrometer is an instrument for reading and analyzing light as pertaining to objects such as in moving pictures.

One object of my invention is the development of a scientific and accurate manner of operation in the moving picture industry, from the taking of the pictures to the showing of them to the public.

In each and every distinctive step in this procedure, light is required, being first used in taking the photograph and from data thus secured the developing is accurately controlled. The control of light is an important factor in the printing of the positive film from the negative and on the control of light in a picture projector is dependent to a great extent the satisfactory representation of the picture.

Under the present practice of taking moving pictures or in fact photographs of any nature, there is no accurate and scientific way of measuring the quantity of light combined with what might be termed its quality from a photographic standpoint, independent of the comparison by the eye or skill in the art of photography.

There are various light registering devices used in photography such as sensitized material or the like which may be exposed to light for a certain definite time, thereby to a certain extent giving an idea of relative illumination, but this must be compared with a standard, or dependent upon the eye.

There is no definite procedure for determining the quantity and the quality of light which passes through a camera lens and affects photographically the film on which the scene is photographed. As most of the devices used as aids to the photographer or camera man in determining the photographic value of light consume considerable time and also rely on his judgment, they are rarely used, the skill of the camera man in motion pictures being relied upon to obtain a satisfactory result.

In all photography, especially as applicable to moving pictures, it is well known that the different colors of objects have a material effect on the resulting picture. Some objects photograph much quicker than others, even when films are used which are more or less sensitive to the whole range of the spectrum, and as the colors which photograph poorly are those to which the eye is most sensitive and those colors which photograph readily are colors to which the eye is more or less insensitive, a person cannot readily judge the photographic value of light being reflected from a scene in order to accurately operate a camera in taking motion pictures to secure uniform results. For instance, the lights of short wave length such as the violet, the invisible, ultra-violet and the indigo are very actinic in their photographic powers and may be termed photographically positive colors. The eye, however, is not very sensitive to these colors, the ultra-violets not registering on the retina as colors. The orange and red of much longer wave which may be designated as photographically negative colors, do however, impress the eye and cause a person to misjudge the photographic effect of any definite scene having these colors incorporated with others.

Objects of the various colors of the spectrum may be satisfactorily photographed on a time basis, giving the photographically negative colors a longer exposure than the photographically positive colors, but as a rule this is not possible in moving pictures as these have to be photographed a certain definite number of exposures per second, and in various scenes the colors present different proportions. Most of the devices for indicating the photographic value of light are not adapted to use in registering the light reflected from any particular scene as it is difficult for a camera man to properly estimate the light, my cino-spectrometer may be utilized to obtain definite recordable values from a photographic standpoint.

The construction and operation of my cine-spectrometer will be first described in its application to the manual and automatic manipulation of cameras; its secondary application in the developing of films; its manual application in printing and procedure in recording the proper light for projecting pictures.

The cino-spectrometer as an instrument comprises a photo-electric cell which may be properly mounted to receive light having various electric circuits for energizing the cell and preferably amplifying the currents as affected by the resistences and the electron flow developed in the cell and in conjunction therewith a meter which may be utilized to register the quantity and photographic quality of the light. This meter may be self-recording if desired. The photo-electric cell may have any suitable light sensitive surface utilizing selinum or some of the so-called alkali metals such as potassium, sodium, lithium, rubidium, etc. However, as the photo-electric cells may be readily purchased on the market, I have found it satisfactory to use a cell sold under the trade name of Radiotron U. X. 112 tube. This combines photo sensitive materials with a triode tube for developing an electronflow and amplifying to a certain extent.

In the taking of moving picture photographs the moving picture camera is usually provided with a rotatable turret having four lenses having photographic qualities. When focusing a camera the lens to be used presents an image to one side of the camera proper, the camera being shiftable laterally so that an exact focus may be obtained in the position in which it will register on the film. Then the camera is replaced in photographic position and the turret turned for taking a picture. In the camera I preferably mount the photo-electric cell in such a position as to have the image cast thereon and therefore obtain the full light value from a quantity and quality standpoint as it would be recorded on the film. Then by reading the meter or noting the automatic recording meter the camera man or his assistant will note the reading defining the quantity of light. Although the meter I use is in effect a milli-ampere meter, it may be graduated in units defining

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certain established quantities of light. I may if desired use such quantities as are equivalent to the so-called units of lumens or other arbitrary values.

In the manual or automatic manipulation of cameras in accordance with my method, it is necessary to have a table or chart prepared showing the proper iris opening for the camera and time of exposure for different units of light as recorded by the meter. Therefore the camera man after properly focusing the scene and noting the meter reading caused by the photo-electric cell will set the iris to the designated value; or to the iris may be automatically operated, and the shutter to be operated the proper speed, and thus the photographs may be taken on a scientific basis independent of judgment of light values and such like by the eye.

A reel in being taken has recorded thereon the light value at the time of taking. In the developing of the film a developer having a certain formula and time of development will be utilized in accordance with another prepared table or chart showing the photographic solutions required, temperature of same and time of development for films taken under certain known units of light value.

In printing the negative a standard light is shone there through on to my cino-spectrometer in order to obtain the light value transmitted through the film. In reality this measures the relative density of different films. I may either use a standard light such as utilized in the printing or a separate standard light which will give a known reading. A set of tables or charts prepared from films of standard density as recorded on the meter through the electric fluctuations caused by the light on the light on the photo-electric cell as shining through films is then utilized to determine the iris opening of the printing lamp and the voltage required for such lamp. The light used in printing may be varied by changing the iris opening through which the light passes through the negative or by changing the intensity of the light.

In the projection of moving pictures the quality of the picture is dependent very much on the light in the projector and also on the reflective quantities of the screen. Therefore, I use my cino-spectrometer in the theatres for reading the quantity of light as reflected from screens and thus determine the intensity of light required in the projector to give a certain definite standard result, and making it possible for studios to use a standardized density for all released prints.

My invention in its several phases as an instrument and a method of procedure will be more readily understood from the following description and drawings, in which:

Figure 1 is a side elevation taken in the direction of the arrow 1 of Fig. 2, showing a moving picture camera with my cino-spectrometer mounted thereon in position for recording the quantity and photographic quality of light from a scene to be photographed.

Fig. 2, is a rear elevation of the camera taken in the direction of the arrow 2 of Fig. 1.

Fig. 3, is a diagrammatic view of a photo-electric cell incorporated with a triode valve, the electric circuits therefor and indicating a meter.

Fig. 4, indicates diagrammatically the light sensitive portion of a standard photo-electric cell.

Fig. 5, indicates diagrammatically a self-recording meter for indicating the quantity and photographic quality of light.

Fig. 6, is a diagram of a mounting for my cino-spectrometer in printing from negatives, utilizing the light from a standard printing lamp.

Fig. 7, is a mounting alternative to Fig. 6, utilizing two standard lamps, one for printing and the other for measuring the light through the negative, both lamps being on the same circuit.

Fig. 8, is a diagram of a circuit similar to Fig. 3, suitable for recording such light, and operating a relay.

Fig. 9, is an elevation partly in section of my cino-spectrometer separately mounted on a stand and showing it usable as a separate instrument for recording the quantity of light as for measuring the intensity of reflected light from a theatre screen, painted surfaces for mixing paint, etc.

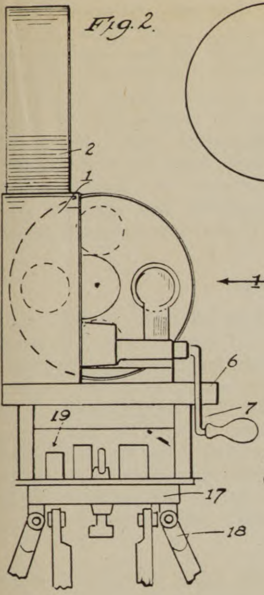
Fig. 2.

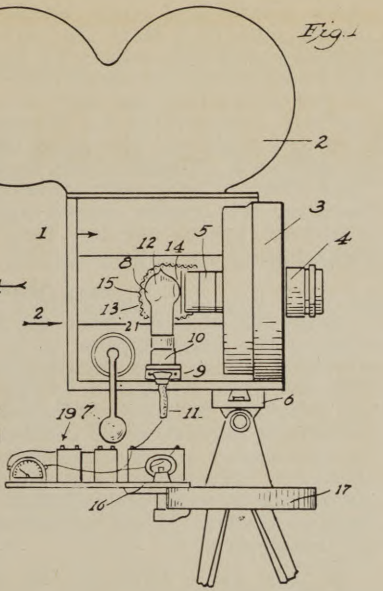
Fig. 1

The adaptation of my cino-spectrometer to a camera is substantially as follows, having reference particularly to Figs. 1 and 2:

The camera is designated generally by the numeral 1, having a magazine 2 for the films and a rotary turret 3 having lenses 4 mounted thereon. A focusing lens 5 is secured on one side of the camera so that when the camera is shifted laterally on the track 6 any particular lens through which it is desired to photograph may be positioned in register with the focusing lens 5. The ordinary crank for winding the films and taking the photograph is illustrated by the numeral 7.

The above description and drawings designate a well-known standard type of camera, but it is to be understood that my cino-spectrometer may be applied to other types and makes of cameras by having the mounting as desired.

A photo-electric cell 8 which may be of a standard type or specially constructed for use with cameras is mounted on a bracket 9, this latter being preferably secured to one side of the camera, the bracket having a socket 10 whereby the lamp makes the proper electrical connections through a lead conduit 11.

The photo-electric cell generally is formed with a glass bulb 12 at the end having a silver coating indicated by the numeral 13 with a window 14 through which the light enters. This window will be placed directly in the path of the light so that the image will be cast inside the bulb and therefore the cell will be affected by the total quantity of light which would photographically impress itself on the film were a picture being taken. A hood 15 of light-proof flexible material is utilized to cover the focusing lens and the photo-electric cell to exclude external light.

For purposes of illustration I have indicated the various batteries of sources of electrical power as being mounted on a table 16 secured to a cap 17 on the tripod 18. These instruments are designated generally by the numeral 19 and are better described in connection with the diagrams.

Referring to Fig. 3, a suitable circuit and diagrammatic mounting of a photo-electric cell is indicated by the numeral 8, the reflector by the numeral 13, a light sensitive material by the numeral 20, the focusing lens being designated by the numeral 5. The triode elements of a tube are designated by the numeral 21 and are usually placed in the lower end of the tube and screened from the photo-electric material by a partition 22 as indicated in Figs. 1 and 4.

These elements comprise a filmament 23, a grid 24 and a plate 25. The grid is connected by an electric lead 26 to the light sensitive material 20. The plate 25 is connected to a ring 27 situated in the path of electrons flowing in the light beam; the ring and plate being electrically connected by a lead 28.

An A battery 29 usually of about 4½ volts is connected through a variable resistence 30 to the filament and has a volt meter 31 connected to the circuit. A "B" battery 32 which may be of 90 to 500 volts is connected to the filament circuit and through a variable resistence 33 by a lead 34, through a meter 35 and a lead 36 to the plate and ring, being electrically connected to the lead 28.

As above mentioned the meter 35 is in reality a milliampere and may be so graduated or graduated in the arbitrary units of light. A volt meter 37 is in this work circuit of the B battery. A "C" battery 38, which may be of 45 volts is connected through a variable resistence 39 and the lead 40; a resistence to the light sensitive material 20 and hence to the grid 24. This circuit has a volt meter 41.

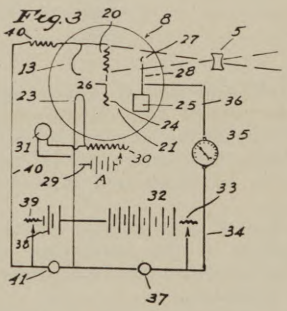
Fig. 3

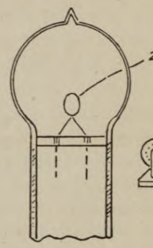
Fig. 4.

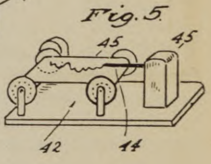
Fig. 5.

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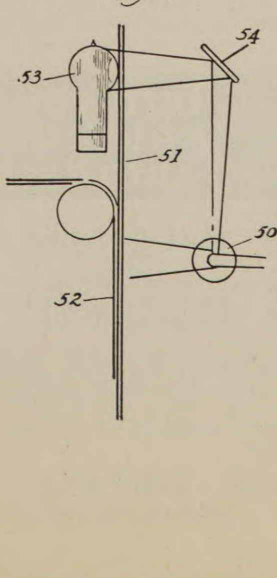


Fig. 6.

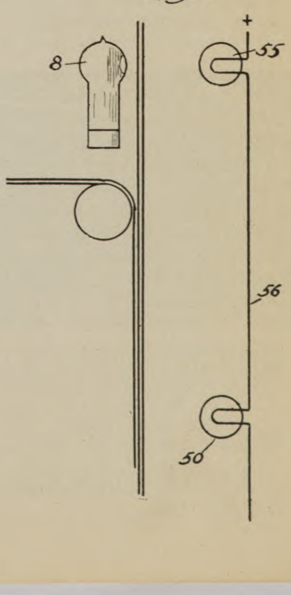


Fig. 7.

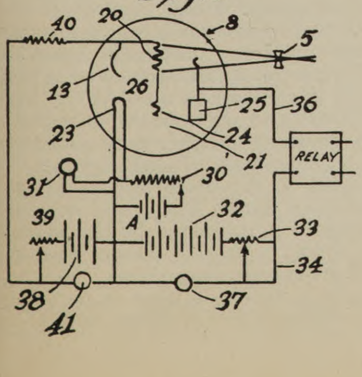


Fig. 8

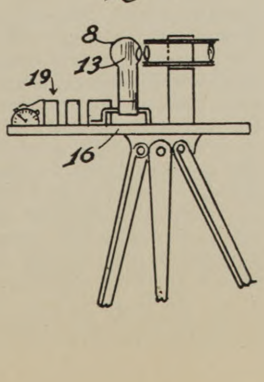


Fig. 9.

# *Factors Which Affect the Contrast of a Lens Image*

*Continued from Page 11*

for experimental error which the method involves. Table 3 summarizes the average data for the four different lens openings. Since the absolute value of the intercept depends upon the intensity of the image-forming light, which is different with different lens openings, it seems best to express the amount of non-image forming light by means of the ratio between the intercept and the average image intensity. This ratio is denoted by R in Table 4.

Table 4. Relation Between Brightness of Non-Image Forming Light and Average Image Brightness for Various Conditions

| F=Number of Lens Stop | Ratio of Peripheral Brightness to Average Brightness of Test Object | R=Ratio of Image Brightness Intercept to Average Image Brightness |
|---|---|---|
| 32 | 7 | .194 |
| 32 | 1 | .094 |
| 32 | .25 | —.003 |
| 11 | 7 | .133 |
| 11 | 1 | .072 |
| 11 | .25 | —.001 |
| 8 | 7 | .110 |
| 8 | 1 | .039 |
| 8 | .25 | .003 |
| 3.5 | 7 | .230 |
| 3.5 | 1 | .029 |
| 3.5 | .25 | .004 |

There is present only a small amount of non-image forming light in all four cases where the background brightness was low in comparison to the average object brightness. As a matter of fact, the intercept of the curves such as A in Fig. 3 was in all cases less than the probable error of measurement.

There is no consistent variation of R with the change in lens opening. The uncertainty of the variation in effective area of reflection surfaces within the lens makes it impossible to guess at any correlation.

It can be stated that for this particular lens, at least, the flare image light originating in the object is distributed throughout such a wide angle that the effect upon contrast of an average subject such as is represented by the test object is negligible. On the other hand, the presence in the camera of light from the peripheral area has a very serious effect. Sky brightness in exterior pictures, for instance, might in many cases be enough greater than the average object brightness to reduce the image contrast by a factor of from three to five. An even greater reduction of contrast is possible in studio work where light from bright sources outside of the object area may enter the camera. It has been pointed out in a previous paper (1) by one of the authors and L. A. Jones, that contrast reduction due to the presence of non-image forming light in a screen image cannot be entirely compensated by laboratory treatment of negative and positive. The same argument will hold in the present cast. Though a flat picture may be considerably improved by increased development of negative and positive, the results cannot approach the quality of a correctly exposed negative free from non-image forming light fog.

### Lens Shades

Since the exclusion from the lens of light which is not used in the image appears to be of importance, it seems desirable to give some consideration to the means by which this may be accomplished. In some cases, as in the making of titles and in some studio sets, the brightness of the peripheral border can be controlled. The title board may be surrounded with black cloth as was done in the experiment just described. In studio photography care in the darkening of walls and windows which lie outside of the field of the lens, would undoubtedly add to the brilliance of the picture.

In most cases, however, the use of a lens hood is the only solution, for the amount of non-image forming light striking the lens can be controlled only in this way. To limit the cone of light entering the lens, a rectangular hood seems the most desirable. A rectangular hood attached to the camera cannot, of course, exactly limit the field without vignetting the picture. It must always be somewhat larger than a frame enclosing the pyramid whose apex is the lens center and whose sides are the rays converging to the center. The following approximate relation will give the size of the frame nearly enough for practical purposes.

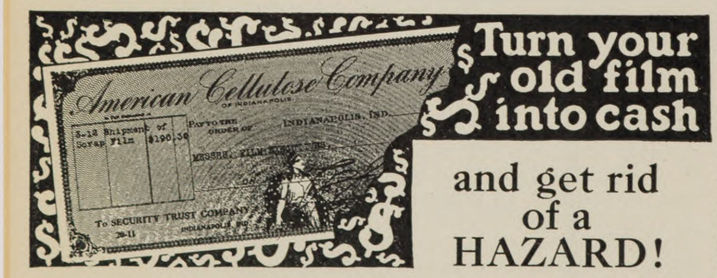
$$\text{Length of Rectangle} = \frac{\text{Length of Hood}}{\text{Focal Length of Lens}}$$

+ Aperture of lens. The width of the lens aperture is found by dividing the focal length by the F number of the lens. The larger the lens hood, the less will be the amount of extraneous light to enter the lens. The length of the hood is limited by practical considerations but the beneficial effect of the hood, at least for short focus lenses, is very marked even with a short protecting hood.

A subject having a visual contrast of about ten to one was photographed out of doors using a two-inch focal length lens and various types of lens hoods. With no hood to protect the lens from the light of the surrounding sky, the contrast of the image was reduced about forty per cent. With a hood fourteen inches long, rectangular in shape, the reduction in contrast was less than five per cent, and with a cylindrical hood of the same length, the reduction was about ten per cent. As the hood was shortened and the hood openings made correspondingly smaller in size, the beneficial effect was somewhat decreased. However, even with a two inch hood supporting a rectangular aperture in front of the lens, the image contrast was only twenty per cent less than the object contrast value.

### Disturbance of Contrast Due to Diffusing

Under the general heading of diffusion may be grouped a number of causes such as dust, finger prints, air bubbles, and imperfect polishing. Data regarding the magnitude of these effects upon contrast is almost valueless since so much depends upon the particular case. A single well-defined finger print upon the surface of a lens may reduce the contrast of the image to one-half of that formed with a clean lens. Dust and air bubbles, if present in great enough quantity to scatter light, may decrease the contrast still further. The effects of diffusion are in practice always superimposed on the disturbances caused by internal reflection and lens flare. That they may be made of negligible consequence is indicated by the almost perfect reproduction of object contrast which was attained in the experiments previously described.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1. The Effect of Projection Lens Flare upon the Contrast of a Motion Picture Image. Loyd A. Jones & Clifton Tuttle. Trans. S. M. P. E. No. 25.

# EASTMAN RESEARCH LABORATORY OPENED IN HOLLYWOOD

## New building last word in laboratory equipment. Contains 35-seat theatre equipped for sound.

ON WEDNESDAY, April 24th, the doors to the new technical research laboratory of the Eastman Kodak Company, at 6706 Santa Monica Boulevard, Hollywood, were thrown open.

And with the opening of this laboratory a long felt want on the part of the cinematographers and technicians of the film capital was filled. For the past ten years executives in the picture industry have realized this need, and rejoicing was general throughout Hollywood when the word was passed that the building had been opened.

The new laboratory, to be operated by the West Coast technical service staff of the Eastman organization, is a thing of extreme architectural beauty as well as a laboratory equipped with every known latest contrivance for the furtherance of the film industry's technical department. It is of reenforced steel and concrete and is 118 feet deep and 35 feet wide and 35 feet high.

The interior is finished in gumwood, with walls a soft gray and with exquisite window hangings that blend. The large foyer is furnished with tastefully selected divans and chairs of overstuffed red leather. There are three offices on the second floor, also a library and conference room.

One of the big features of the building is a theatre equipped for both disc and film sound picture projection. The throw from projector to screen is approximately 60 feet; the ceiling is 25 feet and the width of the auditorium is twenty-five feet.

The theatre is equipped with the very latest in the way of projectors and sound equipment and can well be described as the last word in little theatres. Thirty-five of the latest pattern theatre chairs, wicker with deep cushions, have been placed in the theatre; and each row is placed slightly higher than the one in front, making vision an easy matter for all. There is room for extra chairs, making the theatre capacity fifty.

A research laboratory containing approximately $35,000 worth of modern equipment is another big feature for the cameramen. No expense has been spared in fitting this laboratory with the very latest in laboratory equipment. This laboratory will be open to the cinematographers and technicians of the various studios at any and all times.

With the opening of the laboratory came the announcement by E. O. Blackburn, head of the J. E. Brulatour, Inc., West Coast department, that the laboratory is to be devoted to the cinematographers and technicians of the industry. In other words, the laboratory is as much theirs as though they had built it themselves.

"We want the cinematographers and studio executives and technicians to feel that this is their laboratory," said Mr. Blackburn. "We have built it for them, and it is theirs to use at all times. They will always find our own experts on hand to help them in any way they may desire. Our aim is to give the cinematographers and studio executives real service."

And to prove that there will be a real service at this laboratory, a feature has been introduced that will fill one of the greatest needs of the cameramen. It is a telephone call service. It is the desire of the laboratory officials to have the name and address and telephone number of every cameraman in the industry listed at the laboratory. Then a real personal service will be given each man at no cost whatever. This is one way in which it will work: A producer decides he wants to hire a certain cameraman. He cannot locate him. All he needs to do is to telephone the laboratory. The laboratory will know where the man is at all times. If he is a thousand miles away on location the laboratory will get a message to him no matter what the effort or cost. The laboratory will make this one of its services to the cameramen.

If a cameraman is away on location and some pressing business arises back in Hollywood that must be attended to at once, the laboratory officials will attend to this business, even to the extent of paying a bill if it is within reason. A man's income tax may be overdue and he in the South Seas or the wilds of the mountains. The laboratory will attend to the matter and allow him to pay them on his return.

A cameraman or a studio executive may have an idea for some sound device or something pertaining to film. He can take it to the laboratory and there can either work on it alone or can have the aid of the experts of the laboratory in working out his problem.

There will be a secretary on duty at the laboratory. If a cameraman wishes a letter written the secretary will do it for him and see that it is mailed. In other words, the laboratory belongs to the cameramen and studio technicians and executives—an Eastman service.

With the theatre for sound, and other equipment for sound research, sound problems that are daily coming up in the studios can be studied.

The theatre will be open for the showing of pictures at all times. If a studio executive has a picture he wishes to see privately, he may bring it to the theatre in the laboratory and there may have it projected by the laboratory projectionist, or if he wishes still more privacy, he may bring his own projectionist along and see it and study it with all the privacy of a theatre in his own home.

In the meanwhile the Eastman experts will be constantly working at the laboratory on the various problems that are confronting the industry and will be ever on call by any of the studios.

Perry E. Conner will be in charge of the laboratory and will have an able corps of assistants.

In brief, the laboratory is the last word in completeness and is built for service.

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An International Congress of Scientific organizations of Labor is to be held in Paris in June next, and will be presided by Mr. Tardieu, French Secretary of the Interior.

The aims of the convention are mainly to establish personal contact between adepts of scientific organizations, to promote exact information on previous work of the different organizations, to give the members an exact knowledge of scientific organization, to forward the progress of scientific organizations and to draw a certain number of conclusions from the work of the convention and to submit them to trade organizations, to Governments and to the public.

American films are solicited for showing at the convention. The films to be shown must be those illustrating methods and conditions of work of various enterprises and films showing the application and principles of scientific organization.

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# A. B. C. OF SOUND PICTURES

*By* JOSEPH A. DUBRAY, *A. S. C.*,

(*Third Paper*)

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WHILE physicists were busily engaged in the study of sound vibrations and were making great strides towards the ideal reproduction of sounds, photography was emerging from the realm of the research laboratory and was rapidly taking its place among the essentials of modern civilization.

About the time at which Edison's phonograph made its first appearance, the photographic gelatine emulsions were bringing about a complete revolution in photographic methods and processes, and photography began to lose much of the mystery with which it had been surrounded.

The facilities afforded by the workings of the new photographic processes not only made the new Art so popular that it emerged from the stage of slow evolution to enter the field of extremely rapid progress, but also became an indispensable subsidiary to almost all scientific research.

The keeping qualities of the sensitive gelatine emulsions and the removal of the rather complicated laboratory procedures which had characterized the earlier processes greatly broadened the field of usefulness of photography, which became still greater after the discovery of the means by which the sensitivity of the emulsion could be increased many-folds.

Photography then entered the field of instantaneous exposures, and this and the knowledge of the phenomenon of persistence of vision, lead researchers throughout the world to investigate the possibilities of reproducing movement.

The works of Marey, Muybridge, Jannsen, Friese-Green, Le Roy, Edison, Lumiere and a legion of others, are too well-known to warrant indulging in their decription. The efforts of these scientists and artisans resulted in the motion pictures of today.

The interest aroused in scientific circles by the rapid evolution of photography could not but command the attention of the American wizard, Thomas Edison, and his researches and inventive genius finally produced the Kinetoscope, the first commercial instrument through which motion pictures could be seen. The instrument presented, of course, a number of limitations, chief among which was the fact that only one person at a time could view them.

This limitation was nevertheless of minor consequence in Edison's mind, since his main object was to **"find an apparatus which would reproduce a great number of photographic images IN COMBINATION WITH THE PHONOGRAPH."**

It is fairly well known that the synchronization of the series of photographic pictures with the sounds emitted by the subject being photographed was the main goal to which tended Edison's efforts.

It was in 1887 that Dickson, working then in collaboration with Edison, brought to light an apparatus on which the photographs were taken on a glass cylinder, previously coated with a sensitive emulsion, and synchronized with a cylinder sound record.

While Edison and Dickson were at work in the solution of the problems involved in their investigation, another great step towards the development of photographic procedure was being made. The possibility of preparing celluloid sheets of uniform thickness and transparency lead some investigators, among whom George Eastman, to replace the glass plate by this flexible material as a support for the photographic sensitive emulsion.

The importance of this revolutionary advance in the art of photography is perhaps under-estimated by modern photographers and cinematographers, who have become so accustomed to its use and to the perfection of manufacture of this produce that the real portent of the discovery is little recognized.

Anyhow, Edison did not overlook the possibilities inherent to it and since George Eastman began to be able to supply him with short emulsion coated celluloid strips, he replaced the glass cylinder for them, and, in 1888, he completed a first apparatus which combined a film Cinematographic camera and a phonograph recorder. This apparatus was called the **"Phonokinetograph."**

The synchronization and reproduction of the photographic and phonographic records were obtainable by mechanical means, and this explains the little success of the process which never entered the field of commercial exploitation.

The problems inherent to the process and which Edison and Dickson set to solve, were mainly those pertaining to the synchronization of the photographic record with the sound record. The task was arduous at a time when both apparatus, the motion picture camera and the phonograph were still in their embryonal stage.

The laboratory experiments of these two indefatigable workers remained as such, and only the withdrawal of motion pictures from the peep-hole box and their presentation upon a screen seemed to open new horizons for the development of the ambitious dream.

It must be kept present to the mind that the phonograph of these times, though giving a marvelous display of a man's intelligence and love for Science, was nevertheless a mere toy when compared with the instrument of today, and motion pictures were but a crude attempt to give an impression of motion obtained with inadequate instruments and facing a number of undreamed of problems. Nevertheless, the promises that the two infants held in store were amply justified by the unselfish work and the faith of few enthusiasts.

In the secrecy of their laboratories, other researchers were devoting their time and energies to the solution of the same or similar problems, and a remarkably broad vision of the possible solution of the problems inherent to pictures and sound synchronization was given to the world as early as 1880 by the work and disclosures of Fritts, but with no practical application.

The brilliant achievements of the Lumiere Brothers, in 1896, at which time motion pictures were finally shown to an audience by projection upon a screen, spurred scientists all over the world, and, in 1898, we find a Frenchman, Mr. Ducom, developing a synchronized system through which the phonographic record was heard by means of a head piece. Each seat of an auditorium was equipped with such an instrument.

In 1900, another pioneer in French Motion Pictures, Mr. Gaumont, presented a phonograph and a motion pictures projector mechanically synchronized. The two records were, however, to be made separately, due to a number of mechanical limitations which seemed unsurpassable at that time.

In America, a mechanical genius, Daniel Higham, was in the meantime inventing a loud-speaking phonograph, and Edison, always anxious to gather around himself the most promising talents, engaged him and from their association a mechanical synchronizer was born through which for the first time a picture and a sound record were made simultaneously, and presented to an audience limited in number, it is true, but nevertheless an audience which did not have to depend upon individual head pieces or individual picture apparatus for seeing and "hearing" a motion picture.

Pathe Freres, in France, also tackled the problem, and succeeded after several years devoted to experimentation, to obtain a remarkably good synchronization in both the taking and the producing of sound pictures which followed the fate of all other similar systems, that is to

*Continued on Page 39*

# EVERYBODY'S IN THE MOVIES NOW

## A New Family Album is Now Revealed, Alive with Light

*By* VAL J. ROPER

[This article originally appeared in the National Lamp Works' magazine, "Light," published at Nela Park, Cleveland. Due to the unusual amount of valuable information it contains, and because of our desire to give our amateur readers the best there is, we are reprinting it through the courtesy of the Editors of "Light." Mr. Roper is himself an enthusiastic director and producer of home films.—Editor's Note.]

NEW stars in the movie heavens—hundreds, thousands, even millions of them! You and I belong to this great galaxy. So do our families, and especially the kids. Only a handful of this host of new heroes and heroines has been developed so far, but wait. Posterity shall see you in your true colors. Likewise Uncle Casper's nose will be revealed as faithfully as the sunset.

**Val J. Roper**

The home movies brought all this about. Heretofore the art of the cinema belonged to those who served it in the way of a profession, or (in news reels) to persons eminent in news or politics. Nowadays the humble man who's never been to Hollywood, nor ever won special distinction of any kind may keep his memories of pleasant days in living diaries which he may turn to in his reminiscent moods, or which he may proudly display to his friends.

Think of how often we endeavor to recall the happy scenes of childhood. Tomorrow's adults may refer to their visual records. They will be able to shed their years as they behold themselves again as boys and girls. Grandmas of the future will never feel very old when they can turn back time with the home movie and see themselves as children.

While the amateur movies admit us to stardom in the family film album, they also provide other thrills which are not to be overlooked. As directors and cameramen of our own productions we unearth hidden abilities and develop all our resources in art and drama.

All this is possible with a small movie camera, a projector, the safety 16-mm. width film, and a screen. This equipment requires only a modest expenditure; it has taken private movies from the category of a rich man's fad to a place in the average household comparable to that of the radio.

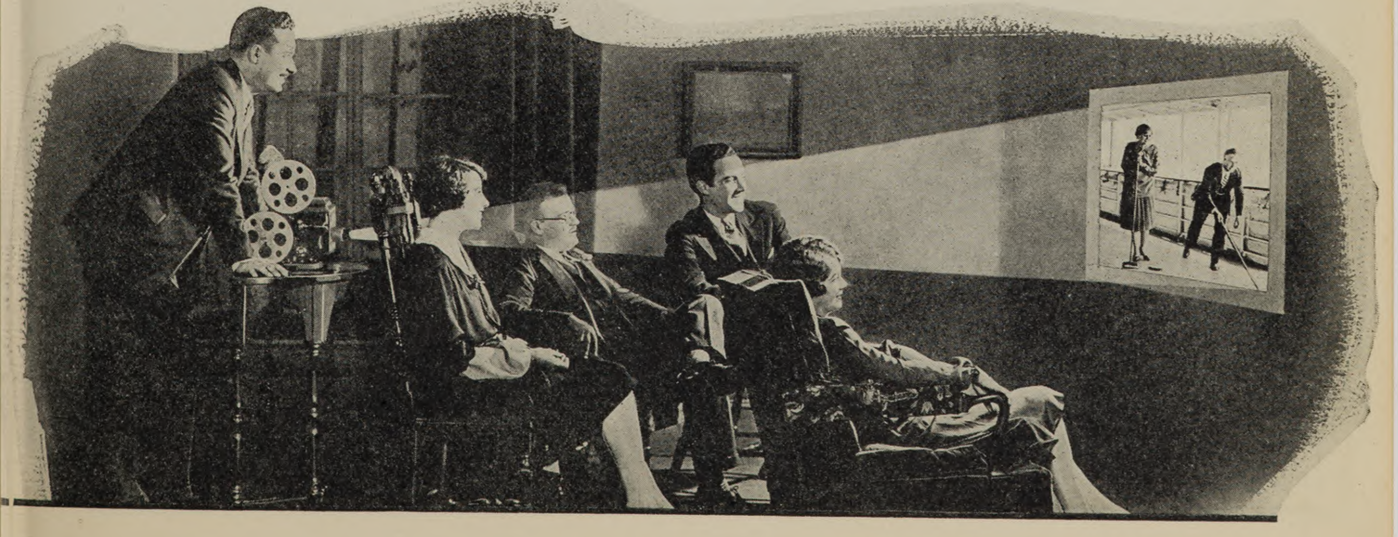
So thoroughly has the home movie equipment been developed for its purpose that excellent results are assured to the most inexperienced amateur. The camera may be loaded in daylight—of course not in direct sunlight—this task is almost as simple as that of loading your snapshot camera. Then to take the pictures, one need only to follow simple directions in setting the lens shutter opening for the brightness of the day; focus the lens for distance, if it is not the fixed focus type; point the camera at the scene to be "shot;" pick up the action in the view finder; and press the button, or lever. The film is developed for you and returned without added expense, ready to be threaded in your projector. Then with the turning of a switch, the pictures are automatically projected on your screen. This screen may be a sheet, a tablecoth, or a piece of white paper stretched on a wall, or it may be a miniature of the "silver screen" of the theater. The standard type of screen provides the brightest picture to be sure.

Of course the showing of motion pictures in the home is not limited to those taken by ourselves. To supplement the program and make it more interesting to our guests, we can rent or purchase from the local film library appropriate short subjects, newsreels, comedies, short features, travelogues,—practically anything that is shown in the large movie houses. Cost of subjects purchased outright averages very little higher than that of those we take ourselves.

The home field is just one of the large applications of non-professional movie cameras and projectors. The motion picture is now recognized as a valuable aid to the teaching profession, and as a most excellent dispenser of sales and business propaganda. While the larger standard 35-mm. width film with semi-professional and professional equipments must still be extensively used in these fields, the smaller 16-mm. width film and projectors employing it, because of their lower cost, relative simplicity of operation and extreme portability, are very popular here as well as in the home. They, together with the so-called film slide projectors, which for the shorter throws and smaller audiences supplant the bulky glass

*Continued on Page 29*

Proof of the joys of amateur moving making is in the showing. Now we may perpetuate actual incidents with thrilling veracity



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in focal lengths from 1-inch to 4-inch

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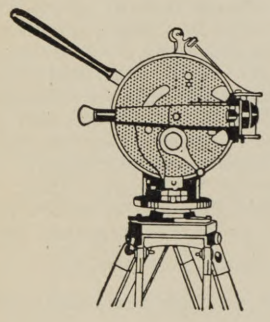

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DEBRIE

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Latest catalogs and information on request. Your old camera may be traded in at its present cash value.

BASS CAMERA COMPANY
179 West Madison St., Chicago, Ill.

## Cino-Spectrometer

*Continued from Page 21*

The action of the above circuits in connection with the photo-electric cell is substantially as follows:

On increase or decrease of light the light sensitive material not only changes its resistence but causes an electron flow which varies the flow of electrons between the filament 23 and the plate 25 and hence varies the current in the work circuit indicated by the meter 35. If the changes of current are weak due to the effect of increasing or decreasing light, such factors may be compensated for by a sensitive adjustment of the meter on utilizing additional amplifying circuits if desired. I do not illustrate herein any external amplifying circuit as these are well known and commonly utilized in the radio, telephone and such arts.

In Fig. 5, I indicate a recording meter designated generally by the numeral 42 having a moving web of material 43 with a pencil 44 actuated by a meter 45; this arrangement usually requiring an amplifying circuit to actuate the meter 45.

The manner of using my cino-spectrometer as above described is substantially as follows:

The camera is focused on the scene to be taken in the usual manner, it being presumed that the lighting or the like is sufficient. The photo-electric cell is then placed behind the focusing lens and the amount of light received thereon interpreted by reading the meter 35 or a self-recording meter. If the light reflected from the scene is not sufficient or too much, if an in-door scene, the light may be changed. By utilizing a prepared table or chart the camera man then sets the iris of the camera and the shutter regulating mechanism in accordance with the setting designated corresponding to the amount of units of light designated on the meter. He may then photograph the scene, knowing that the camera is properly and scientifically adjusted to obtain the best results.

After a reel has been taken this is marked with insignia designating the light units under which it was photographed. If a reel has been used for several different scenes having different units, these would be indicated on suitable markings to give the proper information in the developing laboratory.

(To be continued in the June Issue)

## New Color Process to Appear This Month

London—The Wolff-Heide color process which has been acquired for the world by the United Film Industries, Inc., of New York, will begin demonstrations by May. Regular cameras are used while the coloring is done via a secret chemical process.

## Western Electric Challenges Foreign Sound Patents

Berlin—Western Electric has filed suit here challenging the validity of certain sound film patents of the Siemens-Tobis-Phototone combine. Lawrence Hermes of the Tobis combine stated that outside of America the combine is in a strong position as regards basic patents, holding patents of Tri-Ergon and Kuchenmeister, in addition to those already held by Siemens and A.E.G.

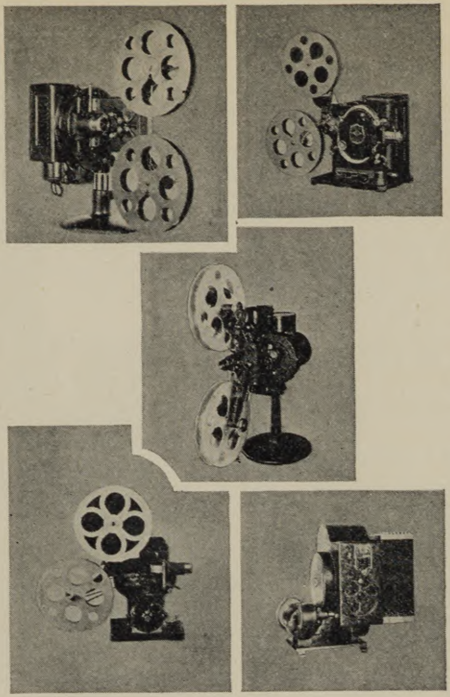
"Our position in Europe as regards sound film patents," he said, "is sufficient to ensure a practical monopoly not merely in Continental Europe but also in the British Isle and Empire."

## The Why and Wherefore of the Mazda Lamp

*Continued from Page 7*

effect on the lamp. If it is burned at a lower voltage than that for which it is designed the lamp falls off in candlepower very rapidly. On the other hand, if the lamp is operated above its labelled voltage, the life is shortened at a rapidly increasing rate. It is, therefore, essential for good lamp performance that the voltage of the operating circuit be held constant at the labelled lamp voltage figure.

slide stereopticon projectors, find application in the classroom and small lecture hall, and are the standard accessories of many traveling salesmen.



Herewith are shown a group of excellent home movie projectors which, with the able aid of Mazda lamps, make the new family album throb with life.

Along with the success of the amateur movie goes another chapter in the development of MAZDA lamps. These play a vital part both in the taking and the projection of pictures. A new line of standard projector lamps has been created to specially meet the requirements of the portable projector field. A new light source, and a special base and socket are incorporated in this new line of lamps which answer the requirements of every type of unit. Because of the smaller picture size of the 16-mm. safety film, the effective light source area is much less than with the large 35-mm. width film employed in the larger portable and standard theater projectors. Therefore, a highly concentrated filament must be used to give sufficient illumination. The wattage which can be employed is, of course, definitely limited as, with other factors constant, the source size increases with the wattage. Our extensive tests have proven that, at the present time, the 200-watt, 50-volt lamp gives the best average results in the 16-mm. film projectors. The 50-volt filament is more concentrated than the 115-volt filament of the same wattage, hence it is better adapted to the optical systems of these small projectors. The use of a 50-volt lamp necessitates a series resistance to reduce the circuit voltage to that of the lamp. In the case of the less expensive equipments where slightly lesser illumination can be afforded, it is desirable to use a standard circuit voltage lamp. As the ordinary coiled 115-volt filament is so large that its use would result in considerable sacrifice of light, a special double-coiled, or coiled-coil filament was developed for this service. The regular coiled filament is coiled again, resulting in a more highly concentrated light source which, in the case of the 220-volt lamps, gives 80 per cent of the illumination obtained with the 50-volt lamp in the 16-mm. equipments. No advantage is derived in double coiling the 50-volt filament.

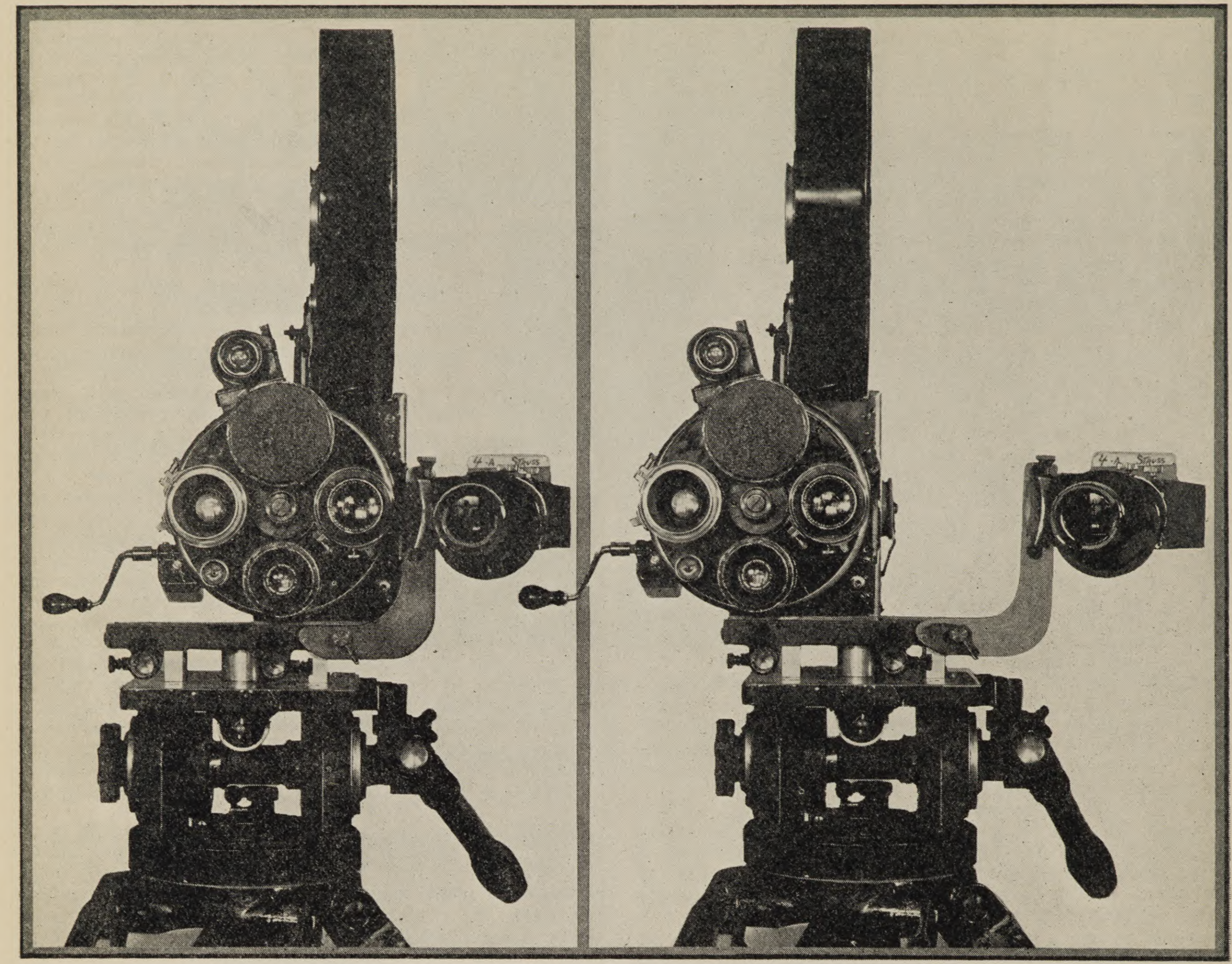
The 100-watt, 115-volt, coiled-coil filement lamp is used in the least expensive projectors which are applicable only to home use because of the comparatively low illumination obtainable with them. Home movies are ordinarily projected at night, in a totally darkened room; therefore the illumination requirement is not so stringent as in the case of movies projected in the daytime in the school room or business establishment.

As mentioned previously, the educational and business fields also employ the 35-mm. film equipment. Large class rooms, medium and large size lecture halls, require equipment capable of projecting a larger picture at a greater distance than is possible with the little 16-mm. film projectors, and the film slide projectors. Two lamps answer these higher illumination requirement, the 500 and 1000-watt, 115-volt, T-20 bulb types.

MAZDA lamps may also have an important role in the taking of the amateur motion pictures. They provide the most convenient light source for filming indoor or night scenes, and their use is especially desirable when panchromatic film is employed. Ordinarily, two efficient semi-matte finished reflecter units, accommodating either the

*Continued on Page 31*

"Shooting" a home scenario does not involve elaborate equipment. Two efficient reflectors with 1000-watt Mazda lamps and plugged into the home lighting circuit are the only accessories to the camera in this scene



# *Karl Struss, A. S. C., Invents New Device for Finders*

Another A.S.C. member has given a new idea to the craft. Hardly a month passes but what one of the members contributes a new invention that is both practical and useful.

This time it is Karl Struss who offers his contribution in the form of a stationary arm or bracket which holds the finder permanently in position away from the camera.

A simple thing, after someone else has thought of it; and very useful if you have a director who likes to watch action through the finder.

The illustrations above tell the story more plainly than words. Struss took a Bell & Howell camera and had Fred Hoefner make the bracket and attach it. A Mitchell finder was added—and there it is. When the camera head is swung over to the finder as the cameraman is lining up there is no difference between this and the old system. But when the camera head is swung back into place the finder remains as in the right figure above.

Struss says he will not patent this, but offers it to all the members of his craft.

## *Mazda Lamps With Cleaners*

*Continued from Page 16*

of the lamp, and thus there is very little change in the amount of light obtained from the lamp during its life.

The accompanying illustrations show very clearly the advantages of this cleaning process. (While the lamp illustrated is not a studio type, nevertheless the effects are similar in the 5 and 10-kw. lamp designed primarily for studio lighting service.) The pictures listed as "A" illustrate a lamp which has been operated for six 25-hour intervals. The progressive blackening is very evident and it is obvious that the light output is materially lower towards the end of its life. Bulbs B and C show another lamp, B before it has been cleaned, and C after it has been cleaned. It is quite apparent that there is practically no loss of light due to bulb blackening in the lamp which incorporates this new scouring material.

Coincident with the development of this mechanical cleaner, improvements have been made in the "sag" characteristics of the filament wire so that even though the filament is operating at a higher temperature, the tendancy of the light source to distort or "sag" is even less than heretofore.

The enormous advantage to the motion picture studios resulting from this development involves savings not only in energy and lamp costs, but also in equipment. For "close-ups" the individual equipments will give more uniform performance and the cinematographer will obtain even more uniform photographic effects. For the larger sets, four equipments with the improved lamps can be used to give the same amount of light as was heretofore obtained from five, often an important feature in the placing of the units to obtain desired effects.

## Australia

Production of sound and talking films will soon be undertaken in Australia, according to the announcement made locally by a representative of a large American producing company.

## *Everybody's in the Movies*

*Continued from Page 29*

500 or 1000-watt tubular bulb projector lamps, serve the requirements of the amateur.

All of the standard line of projector lamps are available with the prefocused base for use in equipments fitted with the prefocus socket. The filaments are accurately aligned with respect to the base at the lamp factory, hence no focusing adjustment is required in the projector. This greatly simplifies the operation of the projector and results in better average illumination, since the filament is more apt to be in its correct position on the optical axis.

Thus do MAZDA lamps contribute to another instance of modern conquest of ancient impossibility, to the magic whereby ordinary men may perpetuate certain hours of their experiences.

Approximate Illumination Intensity Required to Take Pictures at the Rate of 16 per Second

| Lens Speed | Foot Candles |
|---|---|
| F1.5 | 85 |
| 1.8 | 123 |
| 1.9 | 137 |
| 2.3 | 200 |
| 3.5 | 460 |
| 4.5 | 760 |
| 6.5 | 1600 |
| 8. | 2400 |
| 16. | 9700 |

## *DeVry and Q. R. S. Merge*

In line with the trend of modern business is the merger of two of the strongest concerns in the amateur motion picture field—Q. R. S. and The DeVry Corporation. This brings into combination the unusual financial resources of Q. R. S. with the outstanding manufacturing ability of The DeVry Corporation in this particular line.

Q. R. S. has achieved its wonderful financial success in a somewhat different though closely related field, and has only lately entered into the motion picture industry. So that especially fortunate is its consolidation with The DeVry Corporation, which during the last 15 years has occupied a dominating position in the manufacture of portable motion picture cameras and projectors, both in this country and abroad.

The DeVry Corporation, as organized and developed by H. A. DeVry, is well known for its vision, ingenuity and the ability of its personnel. It produced the first successful portable motion picture projector and has since kept not only abreast of the improvements in the line, but has consistently led the field in many important respects.

The amalgamation will enable Q. R. S. to transfer all of its motion picture activities to The DeVry factory, under the active management of H. A. DeVry and his experienced associates. The new financial resources now placed at the disposal of the motion picture end of the business enables the completion within the year of plans which are regarded as years ahead of the achievements thus far recorded in this field.

The new company will now face the market with the most extensive line of motion picture apparatus ever offered the trade by one organization. It will include the whole range of motion picture machinery from the least expensive movie camera retailing at $39.50 to the highest priced combination talking movie outfits for home and business.

---

The Canadian Goverment Motion Pictures Bureau is planning to move its quarters to a bigger and more appropriate building on the outskirts of Ottawa and to acquire new camera and laboratory equipment for the 16 mm. substantial film size.

The studios and laboratories will be so equipped as to permit the making of pictures of educational and scientific interest such as microscopic and slow motion pictures.

EVIDENCE

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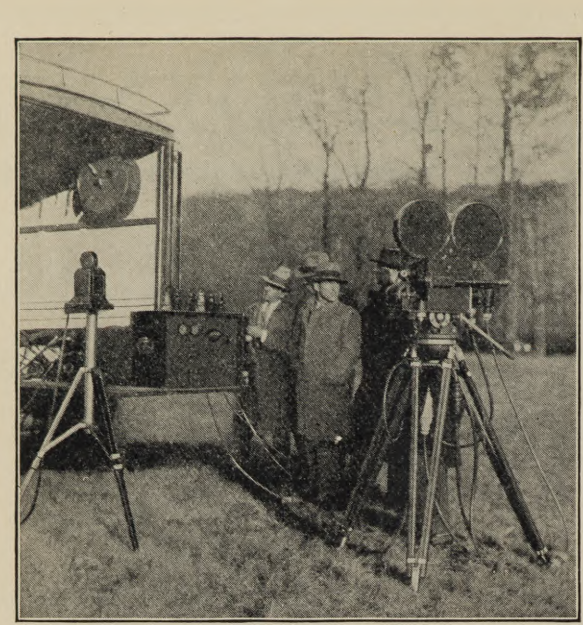

This illustration shows the Akeley Gyro Tripod in actual use by the Western Electric Company, taking sound moving pictures.

# *Again* AKELEY

## . . . anticipated necessity

### *with a tripod ideal for Sound Pictures*

"GIVE us the best camera tripod that human ingenuity can devise!" This was the demand of the sound cinematographers.

It was characteristic of the Akeley Company that its research laboratories had already anticipated this demand and were putting on the market such a tripod—a tripod quiet in operation, capable of great speed and flexibility, vibrationless but light, staunch yet easy to manage.

The Akeley Universal Gyro Tripod, containing the famous gyro mechanism, stands today a leader in this latest field of photography. This tripod is in constant use in many leading motion picture studios making Sound Pictures. These studios include Metro-Goldwyn-Mayer, Fox-Case Movietone, Pathe and Paramount. Other world wide corporations, such as Radio Corporation of America, Westinghouse Manufacturing Company, Western Electric Company and General Electric Company are enthusiastic users of the Akeley Gyro Tripod in their important work. We invite you to write for full description of this Tripod and details of our deferred payment plan.

**AKELEY CAMERA**
**INC.**
**175 Varick Street New York City**

*The Akeley Universal Gyro Tripod*

# COLOR FOR THE AMATEUR

Some timely information for home movie makers on problems facing them when they want color.

*By* MAX B. DU PONT, *Inventor of Vitacolor*

IT HAS been quite a satisfaction to the amateur to be able to make his own moving pictures during the past few years, even in black and white. Shooting pictures is practically ranked as a sport and not only a sport leading to the outdoor life, but, leading to higher ideals and to the better understanding of the wonders of Nature.

**Max B. Du Pont**

A. S. C. Member, and inventor of Vitacolor, who will be ever ready to answer color problems for our amateur readers.

Up to the present time the amateur has had his mind trained to think of a black and white reproduction of Nature, but with the discovery of Vitacolor this has become a thing of the past. Vitacolor will give to the amateur the colors of Nature on the screen. Can you imagine a scene at the Grand Canyon with the ever changing colors, or a glorious sunset on the desert!

To help the amateur in getting the best results in color photography, it is necessary for him to know that when shooting Vitacolor he is only recording on the film black and white values of reflected light consisting of a considerable range of wave length, or in other words, ordinary colors are recorded on the Vitacolor panchromatic film by the selective reflection of the object itself, and the segregation of the said various rays reflected by the object is done by the Vitacolor filter.

The mechanical action of the Vitacolor filter could easily be compared to a wireless receiving station which is tuned to respond to the various wave lengths composing the natural light. This electro magnetic theory of light has been lately received with much favor and is regarded as an electromagnetic phenomenon.

The Dielectric medium is concerned to be subject to a rapidly periodic electric displacement, the variations of which have the magnetic properties of an electric current. In the meantime, the electromagnetic theory is very instructive and shows us what unlimited field is open to our imagination.

When light reaches the surface of an object susceptible of reflection which is the rebound of light-waves from the surface on which they are incident, it either penetrates beneath the surface or it rebounds directly from the surface with more or less absorption, so the degree of coloration of the object depends on the amount of rays partially or totally absorbed by the object. This is the reason why a red flower appears red, because the white light falling on it penetrates the cells of the petals which absorb the green and some of the blue constituents of the light while all the red, orange and a very small amount of blue are reflected back to the eye; the fact being that the coloration of an object is due to its reflecting and absorbing power.

It is interesting to know that a bright red object will reflect nearly all of the incident red light, while a bright green object will only reflect about one-third of the green light, and a bright blue object one-fourth of the blue light. A red object will be the brightest; a green object less bright; and a blue object darker. A yellow object reflects even more red light than a red object, and much more green light than a green object.

As a rough guide to correctness of exposure: The photographer should take into consideration the above chart of reflecting power of differently colored objects, especially when making color study of subjects of an extremely predominant hue.

In order to produce artistic effects, a few of the following hints may help the amateur Vitacolor cinematographer. Remember to avoid large areas of the same color. Bright red and vermillion requires the greatest judgment in photographing. There is very little red in nature; bright red and orange have a stimulating effect on the senses, while greens are especially restful to the eyes; blues give a very pleasing effect and always contribute to the harmony of the picture.

The color composition in color photography is as important as in an oil painting. Soft shadows are useful to give depth and illusion of stereoscopy. The lighting of the subject is of great importance, and its effect should be carefully studied. Side light, flat light, will generally give very pleasing pictures. For back lighting the use of reflectors is recommended. Avoid allowing the sun to shine on the filter attachment, or it will spoil the picture, causing flare and fog.

For portraits a suitable background of a darker shade than the model will improve the results. If shooting in bright sunlight a small diffuser as a piece of muslin held between the subject and the light will produce a beautiful effect.

The Vitacolor process of color photography will give the amateur the satisfaction of producing pictures of full individuality and will always contain evidence of the cameraman's soul and inspiration, and will rank his efforts as a real artistic achievement.

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**Harry D. Brown**

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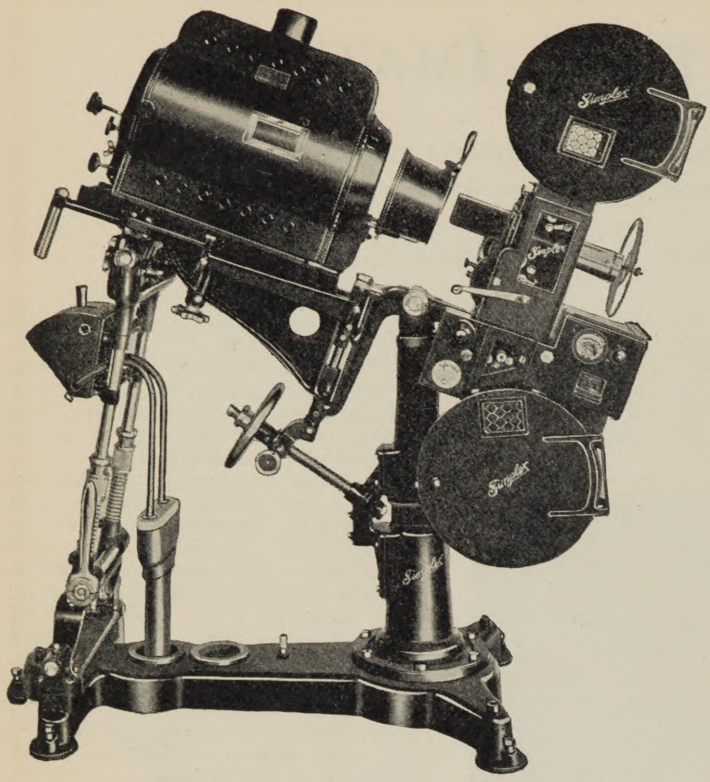

**MOVIETONE EQUIPPED MEANS SIMPLEX EQUIPPED**

***in America's Leading Theatres***

◆ ◆

INTERNATIONAL PROJECTOR CORPORATION
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## *Gennett Synchronous Systems Now on the Market*

Another sound on disc device has been added to the constantly increasing number now on the market. This one is called "The Gennett Synchronous System," and is a product of the Starr Piano Company, of which Fred Gennett is president.

Many months of experimenting have now been completed and Mr. Gennett announces that arrangements have been completed at his Richmond factory for a stupendous production of this device. The machine will be distributed through all Starr Piano agencies.

Mr. Gennett made a trip to the Pacific Coast, where he appointed W. T. Norton as Western supervisor, with headquarters at the offices of the Starr Piano Company, 1344 South Flower street, Los Angeles.

Mr. Norton explains that the Gennett Synchronous System is not a machine "that has been rushed on the market to take a profit advantage," but is a substantial working mechanism, "which reproduces the voice in perfect synchronism with the motion picture."

One of the attractions of this new device which is being stressed by the company is a system of sound absorbers which are said to prevent the picking up of practically all noises generally attendant in motion picture projectors, and is said to eliminate machinery vibrations.

## Carry This Movie Camera In Pocket

One of the smallest motion picture cameras ever offered for sale in Los Angeles has been received by the Photographic Department of the Marshutz Optical Company. This newest of Cine-Kodaks is no larger than an ordinary novel and weighs but three pounds. Holding 50 feet of 16 m/m movie film, it provides the first real lightweight pocket type amateur motion picture camera offered at a popular price.

## *Recent Releases of A. S. C. Members*

"It Can Be Done"—Universal—Ross Fisher.
"Strong Boy"—Fox—Joseph August.
"The Eternal Woman"—Columbia—Joseph Walker.
"The Wild Party"—Paramount—Victor Milner.
"Molly and Me"—Tiffany-Stahl—Frank Zucker.
"Queen of the Night Clubs"—Warners—E. B. DuPar.
"The Iron Mask"—United Artists—Henry Sharp.
"The Sin Sister"—Fox—Charles G. Clarke.
"The Devil's Apple Tree"—Tiffany-Stahl—Henry Sharp.
"The Silent Trail"—Syndicate Pictures—Paul Allen.
"New Year's Eve"—Fox—Conrad Wells.
"The Shakedown"—Universal—Charles Stumar.
"Alibi"—United Artists—Ray June.
"Coquette"—United Artists—Karl Struss.
"Through Different Eyes"—Fox—Ernest Palmer.
"Seven Footprints to Satan"—First National—Sol Polito.

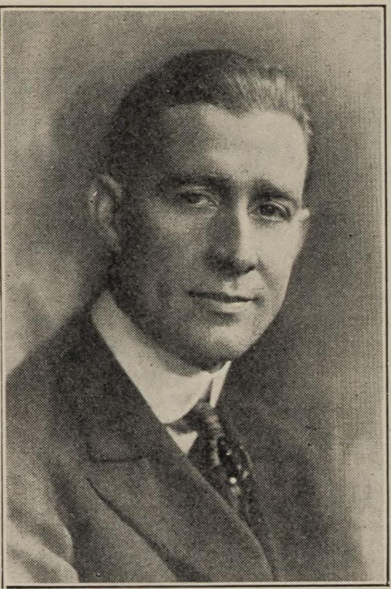
## Another Use for Movies

Criminals are the "stars" of motion pictures now being filmed in large eastern cities. Detectives and police executives are the directors and cameramen.

The movies are not taken for amusement, but for the purpose of recording the walk, mannerisms, as well as the general characteristics of wanted criminals. Copies of the films are sent to police headquarters throughout the country.

According to Gordon Gribben, photographic technician at the Marshutz Optical Company, the amateur motion picture provides an amazingly effective method of aiding the man-hunting game, as practiced by detectives throughout the world.

# DEATH CLAIMS E. BURTON STEENE



**E. Burton Steene**

E. BURTON STEENE, A. S. C., one of America's pioneer aviation cinematographers, will never again climb into the cockpit of a plane to defy death as he photographs the hair-raising deeds of the actors in an air picture.

Never again will he sit in the quiet of the projection room and watch the result of his efforts as they are thrown on the screen at the close of a day in which he has courted death for the sake of his art.

Burton Steene is dead.

On Sunday, April 21, he answered the call of the Grim Reaper, following an illness of one month. Heart trouble was the cause. He was laid to rest on the evening of April 24, after final tribute had been paid at the chapel of the Hollywood Cemetery.

Mr. Steene was one of the most notable figures in the cinematographic world. Away back in 1911 he broke into the movies by the route of news editor of the Pathe Weekly, the first news reel in America. He traveled for this firm as staff photographer and as such saw excitement such as few men are privileged to see.

His first picture from the air was made in 1912 over Lake Ponchartrain, near New Orleans. This was followed by years of service in which he was found shooting air scenes for practically every big air production. During this long and useful career Steene flew with practically all of those early fliers who have made aviation history.

Among these fliers were Lincoln Beachey, who was killed in 1915; Art Smith, who lost his life in the mail service; Katherine Stinson and many noted army and navy fliers. When Brigadier General Charles F. Lee of the Royal Air Force came to America at the head of the British Air Mission he acted as pilot for Steene during the making of a five-reel picture for instruction of cadets and students. General Lee was killed in 1919.

When the real history of motion pictures is written some time in future years, and cameramen are assigned their true place and are clothed with the importance that is theirs, the name of E. Burton Steene will be placed high alongside those other courageous members of the A. S. C. who have pioneered in cinematography and have gone cheerfully "against the guns."

## *A. S. C. Elects Officers*

AT THE annual meeting of the American Society of Cinematographers held Monday night, April 1st, the new Board of Governors for the coming year were elected. On Friday, April 12th, the new Board organized by election the following officers:

John F. Seitz, President; Victor Milner, First Vice-President; Alvin Knechtel, Second Vice-President; Arthur Miller, Third Vice-President; Fred Jackman, Treasurer, and Charles G. Clarke, was re-elected as Secretary.

The retiring President, John W. Boyle, was elected to the Board of Governors. The other members of the Board consist of John Seitz, Victor Milner, Charles G. Clarke, Fred Jackman, Harry Perry, L. Guy Wilky, Alvin Knechtel, Ned Van Buren, Hal Mohr, Dan B. Clark, Arthur Miller, John Arnold, Ross Fisher and Sol Polito.

Mr. Seitz, the new President, has a long and honorable record as a cinematographer with many notable pictures to his credit. He is a born leader and a man who inspires the greatest confidence in his ability to carry out the high aims and ideals of the Society which he heads. The new President is personally popular among the rank and file of the A. S. C. and his administration will have the solid support of the entire membership. In the next issue of this magazine the future policy of the Society will be outlined by Mr. Seitz at some length. Mr. Seitz has a great many really constructive plans for the organization which should be of extreme interest to every one connected with the motion picture industry.

The formal installation of the new officers took place April 22nd, at the Hollywood Athletic Club, with Daniel B. Clark, past president, presiding. An informal dinner preceded the installation.

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During the last quarter of 1928, 229 Educational films were submitted to the German censorship.

## *Patent Troubles Abroad*

Berlin.—Litigation has arisen between German "Tonbild-Syndikat" (Tobis) and the "Klangfilm Company," a subsidiary of A. E. G. and Siemens & Halske. Recently a tradeshow was held in one of the largest cinemas of Berlin by the Klangfilm Company where both soundfilms with synchronized records and sound-on-film reels were shown. Some of these reels were of American origin (R.C.A. Photophone) while others were of Klangfilm experimental production. On the same day Tobis was granted a court injunction against Klangfilm prohibiting the import and production of Sound Films in which picture and sound photographs were separately shot and developed to be ultimately united in the printing process. It need not be explained that this procedure is of fundamental importance as it presents the only solution of the intricate problems involved. The Tonbild-Syndikat was able to obtain this injunction for infringement of their patents against the Klangfilm Company as these patents present one of the chief elements of modern sound film production. It will be remembered that these patent rights were originally granted to Tri-Ergon Company and subsequently have become property of Tonbild-Syndikat after the merger. This injunction is applicable not only to Sound-Films of German production, but naturally to all such films of foreign make, whether shown by the Klangfilm Company or others. At the same time the Tonbild-Syndikat has brought an action against the Klangfilm Company for infringement of patents and damages. As matters stand 'Tobis' seems to have complete control of sound-on-film production in Germany, as practically all such films are manufactured by a separate process, such as 'Movietone' and similar systems.

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# German Scientist Remarkable Figure at Age of Seventy

Perhaps one of the most active figures in the scientific world who is devoting his time to the development of photographic appliances is Dr. Rudolph, outstanding German scientist connected with the firm of Hugo Meyer & Co.

Dr. Rudolph celebrated his 70th birthday last November, but daily he toils for hours in his laboratory near Goerlitz, Germany. He is a man of tireless energy and erect bearing and is constantly working on new ideas for photographic improvement.

Born November 14, 1858, in Kla, Thuringen, he studied in Munchen, Leipzig and Jena and in 1884 was awarded the degree of Doctor Philosophy. He taught higher mathematics at the University for a short time and then became associated with Prof. Abbe, who at that time was connected with the firm of Carl Zeiss in Jena and whose research was largely responsible for improving the quality of optical glasses. Following this, Dr. Rudolph spent several years in the Microscopical Department and in 1890 he invented the first Anastigmat lenses. Until he was pensioned, he was the head of the Photographic department at the Jena works. Aside from the Protar and Anastigmat F:6.8 sets in 1891, he brought out in 1895 the Double and Protar sets working at F:6.3, in 1897 the Planer and Amorphoten, in 1900 the Unar and in 1902 the celebrated Tessar which has become one of the world's standards.

Because of overwork brought on by long hours in the laboratory, his health broke down and he was compelled, in 1910, to retire to the country to regain some of his spent strength. However, his brain was too active to remain in idleness for any length of time and the years between 1910 and 1918 were really the most fruitful of his career, for—

In 1918, after years of study, he invented and patented the first Anastigmatic Sphero-Achromats, which he termed Plasmats. His object was twofold, firstly to construct a faster convertible lens than hitherto considered possible and secondly, the fuller correction for the primary colors of the spectrum which, because of their fuller color correction he termed Sphero Achromatic. Their construction makes possible the focusing on the same plane of the blue and yellow rays.

The firm of Carl Zeiss of Jena made the first tests, but because of previous license arrangement, could not manufacture, for Hugo Meyer & Co., of Goerlitz, had taken over, under license agreement with Dr. Rudolph, the Plasmat patents and had further agreed to take over all his future developments in the years to come.

Dr. Rudolph moved his laboratory to Gros-Biesnitz near Goerlitz in order to be near the works of Hugo Meyer & Co. In 1922, Dr. Rudolph announced the Kino Plasmat F:2, in 1924 the Marko-Plasmat F:3 (free from spherical zones) which is a perfect Sphero Achromat and in 1926 he electrified the industry by his announcement of the first Kino Plasmat working at the hitherto considered impossible speed of F:1.5. This is a worthy achievement for this celebrated physicist, answering as it does the insistent call for the moving picture industry for speed and is conclusive evidence of the high correction of his entire Plasmat series.

In 1924 he also patented the three-color photo apparatus which freed high speed photography from the objectionable Parallex and which also seems very satisfactory for motion picture work.

FOR SALE 3 Bell & Howell Cameras

C. P. BOYLE
428 MARKHAM BUILDING
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# THE FACE ON THE COVER

## A few facts about the first man to appear on the cover of this magazine

FOR ten years the American Cinematographer has adhered to a policy of no faces on the cover. However, times change and with them policies. With this issue the cover policy of this magazine changes and the first face to appear on the cover is that of Ian Keith, an actor whose ability on stage and screen has placed him in the front ranks.

Mr. Keith was born in Boston. His father, William A. Ross, was a well-known inventor. Ian was christened Keith Ross, but took his stage name from his mother's family.

From earliest boyhood Keith was an ardent and avid reader of Shakespeare. While preparing to enter Harvard family financial reverses made it necessary that the young man take a position in a book store in New York. There he fairly lived with his Shakespeare, and through a friend won a scholarship in the Sargent School of drama, from which he graduated at the age of eighteen. But the war was on and he went into the Merchant marine service.

After the war he made his debut in stock in Memphis, Tennessee. The company went on tour and Keith learned 21 Shakespearean plays. Keith next appeared in New York with William Faversham in "The Silver Fox." Frohman saw him and placed him as male lead in "Czarina." "As You Like It" was his next. Then he stepped into "Laugh, Clown, Laugh," in which Lionel Barrymore was playing. This engagement ran a year in New York.

It was while playing in this production that Gloria Swanson saw Keith and selected him to play opposite her in "Manhandled" and "The Queen's Love Story." These were followed quickly by "Love's Wilderness" and "Enticement." Keith then went back to the stage and appeared in "My Son," "Master of the Inn," "An Ideal Husband," and "Monna Vanna." He sandwiched two pictures in with these: "The Prince of Tempters" and "Convoy." Hollywood again called him and he played in "Two Arabian Knights." He and his wife, Ethel Clayton, then toured the middle west in his own stage production, "Firebrand."

Returning again to Hollywood, he played in "A Man's Past" and with Corinne Griffith in "The Divine Lady," and in "The Street of Illusion." Again he went to the middle west with his wife in "The Copperhead" and "The Ideal Husband."

Early this year he returned to Hollywood to play opposite Miss Griffith in her first Vitaphone effort, "Prisoners." It was also Keith's first appearance before the microphone. His work was of such a high standard that First National immediately signed him to a contract to make three more Vitaphone productions, the first of which will be "The Great Divide."

Keith has a remarkable speaking voice and a startlingly brilliant future in talkies is predicted for him.

"More credit should be given the cinematographers," declares Keith. "Where would a player be if it were not for the genius of these men who light us and photograph us. The trouble is that their own light is hidden too much. They are real artists and should be given infinitely more credit for their artistry. They are my friends—and there are none better."

---

## Mechanical Genius Heads Cinema Equipment Company

Now and then one discovers a mechanical genius who seems able to produce anything that one desires, whether it has ever been built before or not.

Nowhere in the world are there more of these men than in Hollywood, for it is in the world's film capital that the impossible is always being done—and at a moment's notice. When the picture producers decide they want something they want it right away, and there can be no such word as "can't."

One of these men who apparently can do anything of a mechanical nature is Captain Ralph G. Fear, head of the Cinema Equipment Company. Captain Fear has been designing new cinema equipment for years, and very few persons think about the unusual ability of the man because he makes the impossible appear so easy.

About a year ago he opened his new factory, after years of work with the various companies as a mechanical engineer. And in this one year he has placed new pieces of equipment upon the market. These new products include friction tripods, high speed movement for Bell and Howell cameras, automatic clutches, motor and clutch adapters and a new developing machine.

This newest product, the Fearless Simplex Developing Machine, has just been finished and installed at the M. G. M. studios. Captain Fear declares that this machine successfully processed film without a single break from the time it was first threaded and without weeks of experimental work and change in construction.

Captain Fear designed many mechanical products while with Paramount, including a high-speed developing machine which has been in continual use for six years. Among other mechanical apparatus designed by Fear are optical printers, inspection machines, geared panoramic tripods, color printing machines, title machines. He designed the Fox Case Grandeur film camera, the Handschigel color camera and a natural color camera. At his own factory he is designing and building all the impossible contrivances that are demanded.

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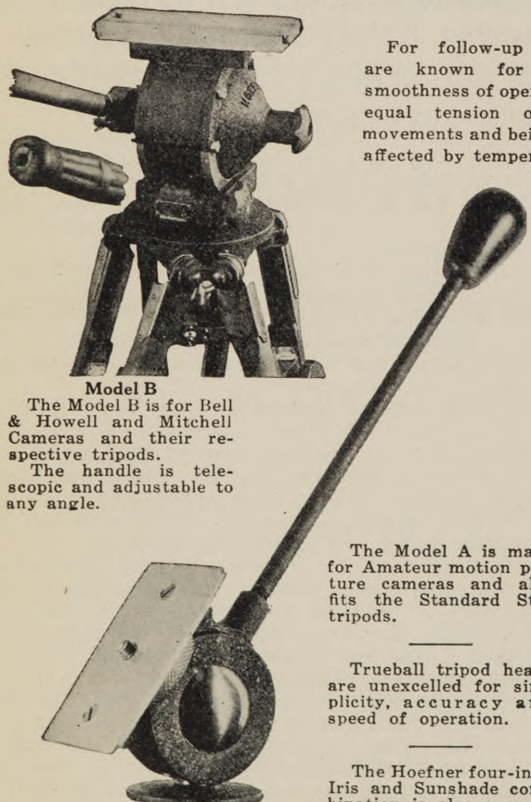


Model B
The Model B is for Bell & Howell and Mitchell Cameras and their respective tripods.
The handle is telescopic and adjustable to any angle.

The Model A is made for Amateur motion picture cameras and also fits the Standard Still tripods.

Trueball tripod heads are unexcelled for simplicity, accuracy and speed of operation.

The Hoefner four-inch Iris and Sunshade combination is also a superior product.

Model A

**FRED HOEFNER**
5319 SANTA MONICA BOULEVARD
GLadstone 0243 LOS ANGELES, CALIF.

# Dawes Turns Waste Into Profit

Opportunity is always around the corner for those who have good eyesight. Take the case of Fred Dawes, of 1426 Beachwood Drive, Hollywood. He has taken advantage of a condition brought about by the talkies and has built up a remarkable business.

The business is that of taking studio negative "shorts" and turning them into "longs," as it were. Studio negative shorts, it must be explained, are created when a cameraman in a dark room following his completion of a scene or when he reaches the conclusion it will be unsafe to go into another scene without reloading, removes from his camera magazines all of the film in it. The exposed film is put into a can and sealed for shipment to the developing laboratory.

The unexposed film, if there be an appreciable length, is put in another can and sealed and marked "shorts," with the length and type of film and name of manufacturer added. Since the coming of sound photography the ends have materially increased in length. In the first place the rolls have been made 1,000 feet long against the former rule of 400 feet. One reason for this is that dialogue scenes on the average run longer than silent ones. Vocal sequences in which the camera does not have a chance to stop turning have run as high as 800 feet.

If the scenes are 500 feet in length, with another long one to follow, the cameraman will not dare go into it with but 500 feet of negative in his mounted magazine. Consequently his only protection is to remove the 500 unexposed feet and replace the negative by a roll of a full 1,000. The short is laid aside. When next it emerges from the can it is in Dawes' testing laboratory, where an examination will be conducted to make sure the roll has not been touched by the light and that also it is in perfect condition.

Of course not all the shorts that come to the testing laboratory are 500 feet. The lengths range from 50 feet up to the sum named, which is unusually long. But there are many of 100 to 400.

By the aid of an electrical splicer the longer shorts that successfully have emerged from the test are made into lengths of 400 and 1,000 feet. Others correspondingly shorter are made up into rolls of 100, 200 and 300, the idea being that there shall be few splices. The splicer employed, it may be added, does its work so effectually that the joined film will pass without hindrance through the magazine of any camera.

During the past year Mr. Dawes has sold more than a million feet of 25 mm. shorts to news weekly men, commercial photographers and even producers. Orders were filled from every state in the Union. That record was achieved as a result of a business development opened in that particular field in four years. Formerly it was the custom of studios to send shorts to the exchanges of their companies for use as leaders or trailers on positive films in order to protect the printed section at each end from damage in threading up the projector. Now the damaged shorts answer that purpose.

EASTMAN, DU PONT, AGFA—STRAIGHT OR PANCHROMATIC 35 MM. ONLY

STUDIO ENDS—Tested and Made Into

100 foot Rolls, 10 feet black leader each end..$2.75
100 foot Rolls, 10 feet black leader each end (on spool) ....$3.25
Same on the new Bell & Howell spool....$3.75
200 and 400 foot Rolls....2½c per foot
17½ foot pieces for Septs, 3 for $1.00, 7 for $2.00, 15 for $4.00
35 foot pieces in individual cans, 1¾c foot in 1,000 foot lots only
White Negative Leader, $2.50 per 1,000 feet
All Films shipped C.O.D.

FRED C. DAWES
Negative Stock Library, 1426 Beachwood Drive, Hollywood, Cal.

## *A. B. C. of Sound Pictures*

*Continued from Page 26*

say, it aroused the interest of the scientists and researchers, but remained within the realm of laboratory experiments.

It is quite necessary that we now depart temporarily from the field of sound and photographic analysis and synthesis in order to rapidly survey developments of a different nature but which were called to play an extremely important part in sound pictures. We refer to the transmission of sound over a distance. The ever-increasing knowledge on elecro magnetism led Graham Bell, in 1876, to the invention of the telephone.

The basis upon which this apparatus was constructed was the known fact that a magnet can produce induced currents in a metal circuit. Graham Bell wound a coil of wire around the pole of a permanent magnet, leaving certain space between it and the coil. In front of the magnet and at a small distance he placed a thin disc of soft iron which could be set to vibrate by sound waves impinging upon it even as the diaphragm in Edison's phonograph. The coil was extended by two wires connecting a similar instrument set at a distance, one of the wires being most of the time substituted by the earth.

Now, if a magnet is held stationary in a wire coil, no effect is produced, but if the magnet is rapidly withdrawn or introduced in the coil, or if a change is brought on its magnetism, electrical currents are developed in the coil itself sufficient to be detected by a galvanometer.

The necessary variations of magnetism are introduced into the permanent magnet of the telephone by the vibrations impacted to the diaphragm when sound waves strike it. The current thus produced flows in alternate direction, and since the diaphragm itself becomes magnetized by induction its varying positions also give a rise to an alternating current in the coil, which flows in the same direction as the current produced by the permanent magnet.

These currents are transmitted through the wires to the second apparatus, the diaphragm of which when used as a reproducer, that is to say, sets in motion the particles of air surrounding it, this motion is necessarily equal to that imparted to the air particles by the sound vibrations at the transmitting end, and therefore are a reproduction of these same vibrations, which the ear detects as sound.

The above brief and purposely simplified description of Graham Bell's telephone is but an introduction of new elements without which the modern art of sound synchronized pictures could not exist.

(To Be Continued in June)

## *Photographer's Association of America to Convene at Buffalo This Month*

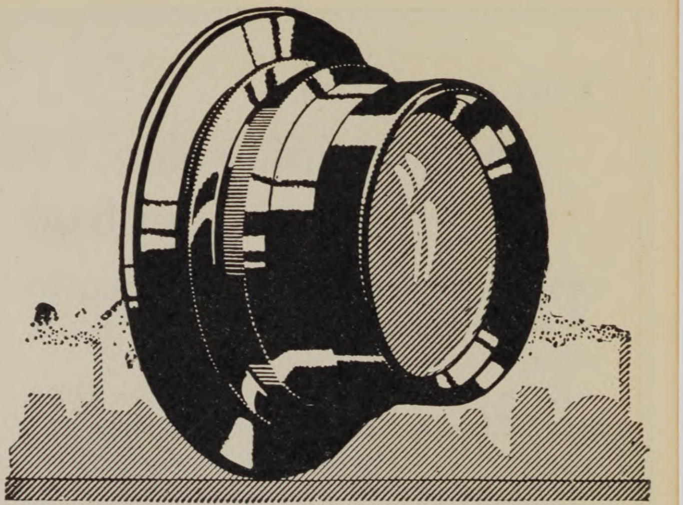
Buffalo, N. Y., has been selected for the forty-seventh annual convention of the Photographers' Association of America, week of May 20th.

Every phase of the photographic field will be covered in the large number of interesting papers scheduled for the meeting. Eighteen papers are listed on the program, covering everything from selling pictures to discussion of the effect of the modern movement on photography.

Advance information indicates a record attendance. Edgar Guest, poet-philosopher, will be chief speaker at the annual banquet.

## *New Projector*

The Bell & Howell Company is stressing the desirability of its Filmo 5-E School Projector for use with 16 mm. films in educational institutions. This model is based on the new model Filmo 250 Watt Projector, recently perfected, which has been very successful in the home field. Adjustments which increase its adaptability to the special problems of school projection have been made and the company reports that immediate popularity has greeted this latest adjunct of visual education.



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## *Fred Archer Heads Warner's Portrait Department*

Fred R. Archer, A. S. C., has just taken over the portrait department at Warner Brothers' studios, and once again will devote his time to photographing the stars.

Archer formerly was with De Mille and then spent five years with Universal, where he headed the title department and gained fame by being the first man to use animated titles. For the past year he has been in commercial work.

## *Agfa Announcement in June*

Agfa discloses the information that an announcement of unusual importance to the film world will be made by their organization in the June issue of **The American Cinematographer.** It has to deal with a new panchromatic stock, but no details have been given out as yet.

During January, 1929, 426 studio days were fully and 94 studio days were partly occupied out of the 552 studio days available.

You can have
high actinic value
without heat

THERE'S nothing like Cooper Hewitts for yielding soft light high in actinic value without excessive heat.

Keep plenty of "Coops" in close (with arcs or Mazdas farther back if you need red rays) and avoid the heat that causes make-ups to run and eyes to suffer from glare.

Coops continue to give economy and satisfaction, just as they have the years past in cinematographic studios everywhere.

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# *Imp-Impregnator*

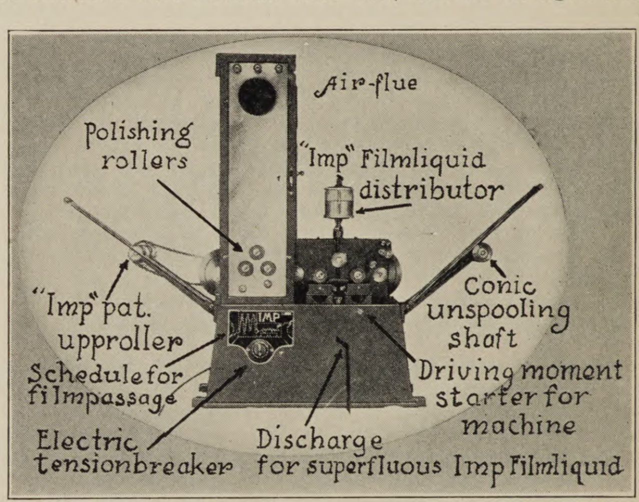
(Contributed)

Helsingfors, Finland:

A. B. Film Machinery O. Y. of this city has perfected a film impregnator which promises to meet with great success among those people and firms who are interested in the prolongation of the life and usability of film. The machine, herewith represented, is guaranteed to renovate film without laboratory handling and to supply the simplest possible method for keeping film copies in good condition.

As is shown in the accompanying illustration the construction as well as the size of the machine is especially indicated for home work, owing to the fact that the machine is compact and easily handled. The impregnating liquid is not inflammable; it attacks neither gelatin nor celluloid surface, keeps the film flexible and removes all the scratches.

The IMP-Impregnator machine is able to handle 2,000 meters of film in one hour. It cleans, impregnates and polishes the film on both sides. The polishing rollers, 5 cmtr. in diameter and covered with felt, can be changed and placed in the drying chamber. A strong airstream passing an oil filter enters the drying chamber and effects quick drying of the impregnated film, taking away at the same time all dust from the polishing rollers.



IMP-Impregnator machine cleans, impregnates and polishes both new and old film copies, and is especially effective for sound films. Owing to the fact that the expense of renovated and impregnated film per meter does not amount to more than the fraction of a cent the IMP-Impregnator should be one of the most useful machines in the industry.

The construction of IMP-Impregnator is the result of 15 years of experimentation, and it depends on a profound knowledge of film fabrication and distribution as well as of technical questions and especially is founded on experience in the theatre business.

IMP-Impregnator means progress—it has come out **from** the practice and is destined **for the practice.**

Camera Rentals

B. & H. Cameras, B. & H. Cameras with speed movement for sound, and Akeley Cameras. One to six inch Lenses, extra Magazines, Tripods, etc.

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# CHARACTERISTICS OF MOTION PICTURE LIGHT SOURCES

## Presented at the Hollywood Meeting of the S. M. P. E., April 9, 1928 — An Abstract

*By* LOYD A. JONES AND M. E. RUSSELL

A paper dealing with relative visual and photographic efficiencies of illuminants[1] was published from this laboratory some years ago. This was followed by a communication in which the use of artificial light in the motion picture studio was discussed.[2] Since that time considerable progress has been made in the production of artificial light and many new and improved light sources have become available for use in the studio. During the past two or three years great improvement has been made in the photographic materials applicable to motion picture work, both with respect to the total or white light speed and from the standpoint of the sensitivity to all of the wave-lengths of radiation within the visible spectrum. The data relative to the photographic characteristics of illuminants published in the communications mentioned above covered the field very satisfactorily at that time, but in order to bring this information up to date, it now seems desirable to publish further information applying particularly to the more modern light sources and photographic materials. That these values may be of immediate practical use the measurements have been made by a very direct experimental method. It seems desirable, however, before taking up the discussion of this method and the results, to consider briefly some of the theoretical relationships involved in the determination of the photographic characteristics of a light source. For a more complete treatment of this phase of the subject reference should be made to the previous publications.

When radiant energy, the stimulus, acts upon the retina of the human eye a sensation, the response, is produced to which the term **light** is applied. In general this sensation is characterized by three attributes: **hue, saturation** and **brilliance.** The magnitude of the brilliance factor of the sensation produced depends upon the intensity of the radiation, which in turn is determined by the amplitude of the vibrational motions that constitute the radiant energy. The hue and saturation attributes depend upon the relative proportion of the various wave-lengths present in the radiant energy. Since the retina is sensitive to only a certain limited range of wave-lengths those lying between 4000 and 7000 mu), and since the brilliance sensation produced by equal intensities of radiation of the various wave-lengths within this region varies in magnitude, it follows that the total brilliance sensation arising from the simultaneous action of radiation composed of many different wave-lengths (such as light from the sun, electric arc, incandescent tungsten, or in fact any commercially useful light source) will depend upon two relationships: (a) the sensibility of the retina to radiation of various wave-lengths, and (b) the intensity of the various wave-lengths composing the heterogeneous radiation.

The reaction of a photographic material to radiant energy may be considered similar to that of the retina. As in the case of the eye, the stimulus is radiant energy, but the response (analagous to sensation) produced has but a single attribute which may be termed **blackness** instead of brilliance. The response of the photographic film is entirely lacking in attributes analagous to those of hue and saturation (the chromatic attributes). Moreover, the photographic material in general responds to wave-lengths of a different range from those that are capable of stimulating the human eye, and even in the case of those materials which are sensitive to all of the wave-lengths within the visible spectrum, the relation between sensitivity and wave-length is very different from the case of the eye. The magnitude of the photographic response (blackness) to radiant energy is dependent (as in the case of retina), however, upon two relationships: (a) the sensibility of the material to radiation of different wave-lengths, that is its spectral sensitivity, and (b) the intensity of the various wave-lengths composing the heterogeneous radiation.

In the simplest possible case, that is where the radiation from the light source travels directly to the photographic material or eye, without passing through or being reflected by any medium capable of changing its quality (spectral composition) by selective absorption, a knowledge of three fundamental relationships makes it possible to compute directly the value of both visual intensity and photographic intensity.

[The authors express here the theory of the three fundamental relationships — "Retinal characteristic," Photographic characteristic," "Light Source Characteristic" and the formulae related to them, expressing the "visibility of radiation," and the "spectral sensitivity of the photographic material" and the "spectral distribution of energy" from which the "visual efficiency" can be computed and expressed in form of equations, care being taken of the absorption of the photographic lens. This theoretical data is omitted in the reprint of this article and the reader is referred to the original text for more complete information.—Editor's Note.]

While the use of the relationships for the determination of visual and photographic efficiency are ideal from the theoretical point of view, many difficulties are encountered in their application to practical problems. The chief obstacle lies in the lack of available data and in the experimental difficulties encountered in obtaining sufficiently precise data relative to the spectral distribution of energy from the light sources of commercial importance. However a thorough understanding and appreciation of these fundamentals is of the utmost value to the worker in this field, since even with the approximate data available it is possible to draw conclusions as to the relative efficiency of various light sources when used with photographic materials of differing sensitivities.

In view of the difficulties of obtaining sufficiently precise data to permit the application of the principles discussed in the previous paragraphs, it was decided to adopt a direct experimental method for measuring the photographic characteristics of the studio light sources. The procedure followed was designed specifically to transferred to a circuit which includes a storage battery powerful electomagnets, and the slightest fluctuation in the current passing through it causes considerable distortion. A beam of light from a powerful arc lamp rigidly mounted at the rear of the camera, passes through the obtain data of practical value and to this end the measurements were made as nearly as possible under conditions similar to those existing in the average motion picture studio. In comparing the efficiency of light sources it seemed desirable to divide the work into two rather distinct parts: the comparison of efficiency (a) with respect to the rendition of the white, black, and gray objects, the achromatic colors, and (b) with respect

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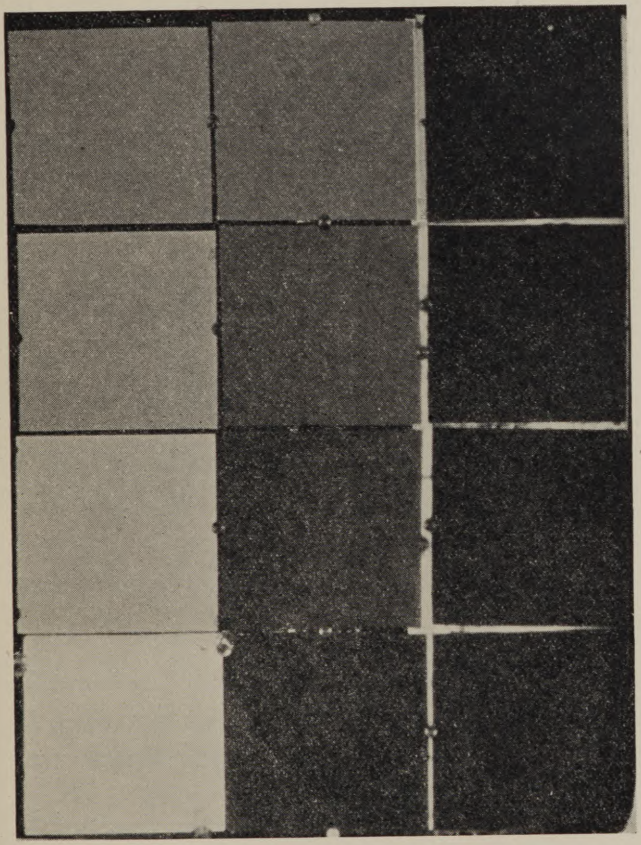
to the correct tonal rendition of colored objects, the chromatic colors.

### Photographic Materials

An exhaustive treatment of this subject should doubtless include the evaluation of source efficiencies in terms of photographic materials of different spectral sensitivities. In view of the present tendency in the motion picture practice, however, to use panchromatic film almost exclusively, the data presented in this paper are confined entirely to relative efficiencies as measured in terms of panchromatic film, and Eastman Panchromatic Motion Picture Negative was used throughout.

### Relative Efficiency in Terms of Gray Objects

Since by definition a gray, white, or black object does not in any way change the quality (spectral composition) of the reflected light, measurements made using a series of gray objects may be regarded as giving values of actual photographic intensity or photographic candle power for the various light sources. For this purpose a test chart was prepared consisting of 12 areas, each 4-inches square, arranged as shown in **Figure 1.** Ten of these were prepared by exposing sheets of photographic developing-out paper. A developer was used which gave a dep having a negligible amount of selective absorption, thus giving a series of true grays. A piece of black velvet and a block of magnesium carbonate formed the end members of this gray series. The reflecting power (**R**) and density (**D**) values for the various areas of the test chart are shown in Table 1. This test chart was hung in a vertical position on a suitable support in front of a black curtain of sufficient size to fill completely the entire field of the camera lens, thus reducing the effects of lens flare to a minimum. A standard Bell & Howell camera equipped with a 75 mm. f/3.5 Zeiss Tessar lens was set up so that the optical axis of the lens was perpendicular to the plane of the chart surface and passed through its center. The distance was adjusted so that when the lens was in sharp focus the image of the test chart just filled the camera aperture. The camera was driven by a directly connected synchronous motor, thus insuring a precise determination of exposure time (**t**).



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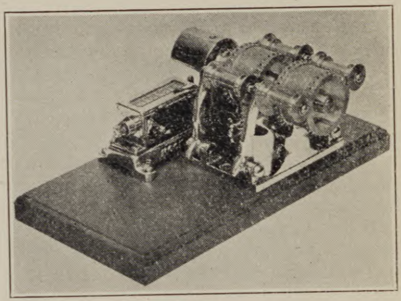

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Table 1

| | Refl. % | Density | Log R |
|---|---|---|---|
| Magnesium Carbonate | 98. | 0.01 | 1.99 |
| Photographic Paper 1 | 68. | 0.17 | 1.83 |
| 2 | 43. | 0.37 | 1.63 |
| 3 | 29. | 0.54 | 1.46 |
| 4 | 19. | 0.72 | 1.28 |
| 5 | 14. | 0.85 | 1.15 |
| 6 | 9.5 | 1.02 | 0.98 |
| 7 | 7.0 | 1.15 | 0.85 |
| 8 | 4.2 | 1.38 | 0.62 |
| 9 | 3.4 | 1.47 | 0.53 |
| 10 | 2.3 | 1.64 | 0.36 |
| Black Silk Velvet | 0.4 | 2.40 | $\bar{1}$.60 |

The chart was illuminated from both sides by light incident at 45° to the plane of its surface, one source being set to the right and one to the left of the camera, thus insuring freedom from specular reflection and also uniformity of illumination over the entire chart surface. Since the entire chart is relatively small (12x16 inches) it was found possible to obtain satisfactory uniformity in all cases.

The illumination incident on the test chart was measured with a carefully calibrated Macbeth illuminometer. These measurements were made on the magnesium carbonate black composing one element of the gray series. A reflecting power of 98 per cent for this surface was assumed, this being in accordance with accepted practice. The values of reflecting power for other areas of the chart were measured with the same Macbeth illuminometer set up in the same position as that occupied by the camera. In this way the values of reflecting power obtained are those actually effective in the photography of the test chart. Readings were made by three observers and results averaged.

The exposure time (**t**), depending upon the taking speed and angular opening in the camera shutter, and the illumination (**N**), incident on the test chart, were adjusted so that a just perceptible density was obtained on the image of a black velvet area. The exposure times used varied from 0.25 to 0.083 second. These are all sufficiently near to the average exposure time in motion picture practice, that is 0.03 second, to eliminate any possibility of the reciprocity failure introducing deviations from the results obtained in average studio practice. Development was carried out in a solution compounded according to a formula used extensively in motion picture work, and for a time resulting in a normal contrast (.=0.80 approximately).

The resulting density (**D**) values were read in the usual manner and plotted as a function of the logarithms of the reflection power (log R) of the corresponding areas on the test chart. Since all other factors are constant, the exposure incident on the film is directly proportional to the reflecting power of the test chart areas, hence the log **R** values are directly proportional to log **E** and the curve thus obtained is therefore in the form of the usual density-log exposure characteristic of the photographic material. A curve similar to that shown in **Fig 2** was obtained in this manner for each light source.

The point on the characteristic curve where its slope (**dD/d** log **E**) is equal to 0.2 was assumed to be the practical limit for the satisfactory reproduction of shadow detail. The assumption of this value may be open to some question but there is strong evidence that it is not in serious error. Moreover, the use of a slightly different value would not change the magnitude of relative efficiency, but only that of the actual exposure required in any case which is of minor importance for the purposes of this paper.

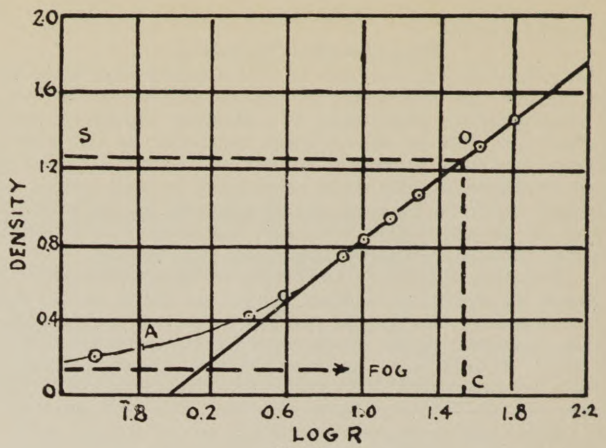

Fig. 2

From available data[2] it is possible to determine for any lens aperture, focal length, and object distance, the relation between the object brightness ($B_o$) and the illumination incident on the film ($N_n$). This, together with the known values of exposure time (**t**) and illumination on the chart ($N_o$), makes it possible to compute the exposure (**E**), in foot-candle seconds, incident on the film and corresponding to the point of limiting useful gradient. This was done for each light source and these values are shown in Table II in the column designated as $E_m$. It is evident that the greater the value of this exposure the less is the photographic efficiency of the light source. In the last column of Table II are values of relative photographic efficiency (**W**) computed on the assumption that the photographic efficiency of mean noon sunlight is 100 per cent. It should be kept in mind that these values of relative efficiency are based on equal intensities and not upon equal energy consumption.

(To be continued)

Table II

| | | | | | Total | | Effective | | Photic Efficiency | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Source | Line Amps. | Line Volts | Arc Volts | Watts | Lumens | L/W | Lumens | L/W | $E_m$ | $E_x$ | $U_v$ |
| 1 | Sunlight | -- | -- | -- | -- | -- | -- | -- | -- | 0.004 | 50 | 100% |
| 2 | White Flame | 38 | 110 | 78 | 4070 | 150,000 | 38 | 45,000 | 12 | .009 | 115 | 43 |
| 3 | Pearl Flame | 38 | 110 | 76 | 4070 | 220,000 | 54 | 66,000 | 16 | .011 | 140 | 36 |
| 4 | Yellow Flame | 38 | 110 | 78 | 4070 | 250,000 | 61 | 75,000 | 18 | .015 | 190 | 26 |
| 5 | Orange Flame | 40 | 110 | 72 | 4400 | 190,000 | 43 | 57,000 | 13 | .014 | 175 | 29 |
| 6 | Red Flame | 44 | 110 | 72 | 4840 | 120,000 | 25 | 36,000 | 8 | .008 | 118 | 46 |
| 7 | High Intensity | 78 | 110 | 60 | 8600 | -- | -- | 25,800 | 3 | .005 | 60 | 83 |
| 8 | High Intensity | 150 | 110 | 80 | 16500 | -- | -- | 209,000 | 13 | .005 | 60 | 83 |
| 9 | Low Intensity | 83 | 110 | 65 | 9100 | | -- | 18,200 | 2 | .008 | 100 | 50 |
| 10 | 1 Hg. | 5.4 | 110 | -- | 510* | -- | 17.9 | 4,600 | 9.0 | .012 | 150 | 33 |
| 11 | 3 Hg. + 1 Ne. | 23.3 | 110 | -- | 2180* | -- | -- | 16,300 | 7.5 | .016 | 210 | 24 |
| 12 | 2 Hg. + 1 Ne. | 17.9 | 110 | -- | 1670* | 0- | -- | 11,800 | 7.0 | .022 | 280 | 20 |
| 13 | 1 Hg. + 1 Ne. | 12.5 | 110 | -- | 1160* | -- | -- | 7,130 | 6.1 | .026 | 335 | 15 |
| 14 | 1 Ne. | 7.1 | 110 | -- | 660* | -- | -- | 2,180 | 3.3 | .033 | 425 | 12 |
| 15 | 1 Hg. | 3.8 | 110 | -- | 430 | 7,700 | 17.9 | 3,100 | 7.2 | .012 | 150 | 33 |

* Power Factor 0.85

# *Foreign News*

## England

A trade paper reports that both the sound and the color processes involved in the making of some special advertising two-reel pictures have been successfully demonstrated in London. The company producing these films is the "General Film Productions" of Kingsway, recently formed, which has secured the exclusive rights for the use of this new sound and color process.

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The Elstree Studios, specially built for sound pictures for Photophone are now nearly completed and comprise most up-to-date sound and lighting equipment.

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The first full length British film to have a Photophone sound accompaniment is now completed. It has been made by British Lion and is entitled "The Clue of the New Pin."

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The new British Instructional Studios at Welwyn, where sound pictures will also be made for Photophone, are nearly ready for occupation, and it is reported that some big and important productions are to be made in these studios.

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According to the British press, industrial films are increasing in demand by the big manufacturers throughout England, and there is no question that the field for this type of films is definitely expanding.

## Bulgaria

There are no studios in Bulgaria, but it is understood that the production of a large National film is being considered. The subject is to be story dealing with the period in which Bulgaria was under Turkish domination and is taken from the story "Under the Yoke," written by the noted Bulgarian writer, Ivan Wasoff.

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There were no laws, decrees, etc., inimical to the interests of American Films promulgated during 1928, nor were there any in existence prior to this date.

## Germany

The A. E. G. (Allgemeine Electricitats Gesellshaft) was well represented at the recent fair in Leipzig from 3rd to 13th of March. Several of the apparatuses exhibited were of the highest interest for cinematographic equipment.

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The first aerial "Quiet Zone" in history came into being on April 11 when, after an agreement between the Department of Commerce, California Aircraft Operators' Association, and motion picture producers, the first captive balloon "Silence" signal was raised at the Metro-Goldwyn-Mayer studios.

The big balloon, to which was attached a streamer with red flags, serves as a signal to passing airplanes that talking pictures are being made at the studios. Under the agreement, whenever aviators see one of these balloons over a studio, they are to avoid the location by at least 2,500 feet.

The plan grew out of trouble encountered by talkie producers when planes flew over the studios. King Vidor, director of "Hallelujah," was the first to complain, when he found open-air sequences in sound almost impossible at the studio because of airplane noises. He reported the matter to the Motion Picture Producers' Association, which promptly negotiated with the aviation bodies.

Violations of the agreement will be handled by the Department of Commerce, according to G. F. Rackett of the picture association's technical bureau.

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Fabian, Max—M.-G.-M.
Fisher, Ross G.—Fox
Fildew, William—

Gilks, Alfred—Paramount
Gray, King D.—Thunder Bay Film, Ltd.
Guissart, Rene—Fox. Elstree Studio, England
Good, Frank B.—Warner Bros.
Gaudio, Gaetano—Warner Bros.

Hallenberger, Harry—Paramount
Hilburn, Percy—M.-G.-M.
Hyer, William C.—Educational
Horne, Pliny—
Haller, Ernest—First National
Jackman, Floyd—
Jackman, Fred W.—Technical Director, Warner Bros.
June, Ray—United Artists

Kershner, Glen—Caddo
Kornmann, Anthony—
Koenekamp, H. F.—Warner Bros.
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Lundin, Walter—Harold Lloyd, Metropolitan
Lockwood, J. R.—

Marsh, Oliver—M.-G.-M.
Miller, Arthur—Pathe
Miller, Virgil E.—F. B. O.
Mohr, Hal—Universal
McDonnell, Claude—London, England
MacWilliams, Glen—Fox
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Palmer, Ernest—Fox
Powers, Len—
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Perry, Harry—Caddo Prod. Met. Studio
Polito, Sol—First National

Roos, Len H.—c /o Steffens Studios, Vancouver, B. C.
Rose, Jackson J.—Tiffany
Rosher, Chas.—Elstree, England
Ries, Park J.—

Schoenbaum, Chas.—
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Snyder, Edward J.—Metropolitan
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Tuers, Billy—Caddo
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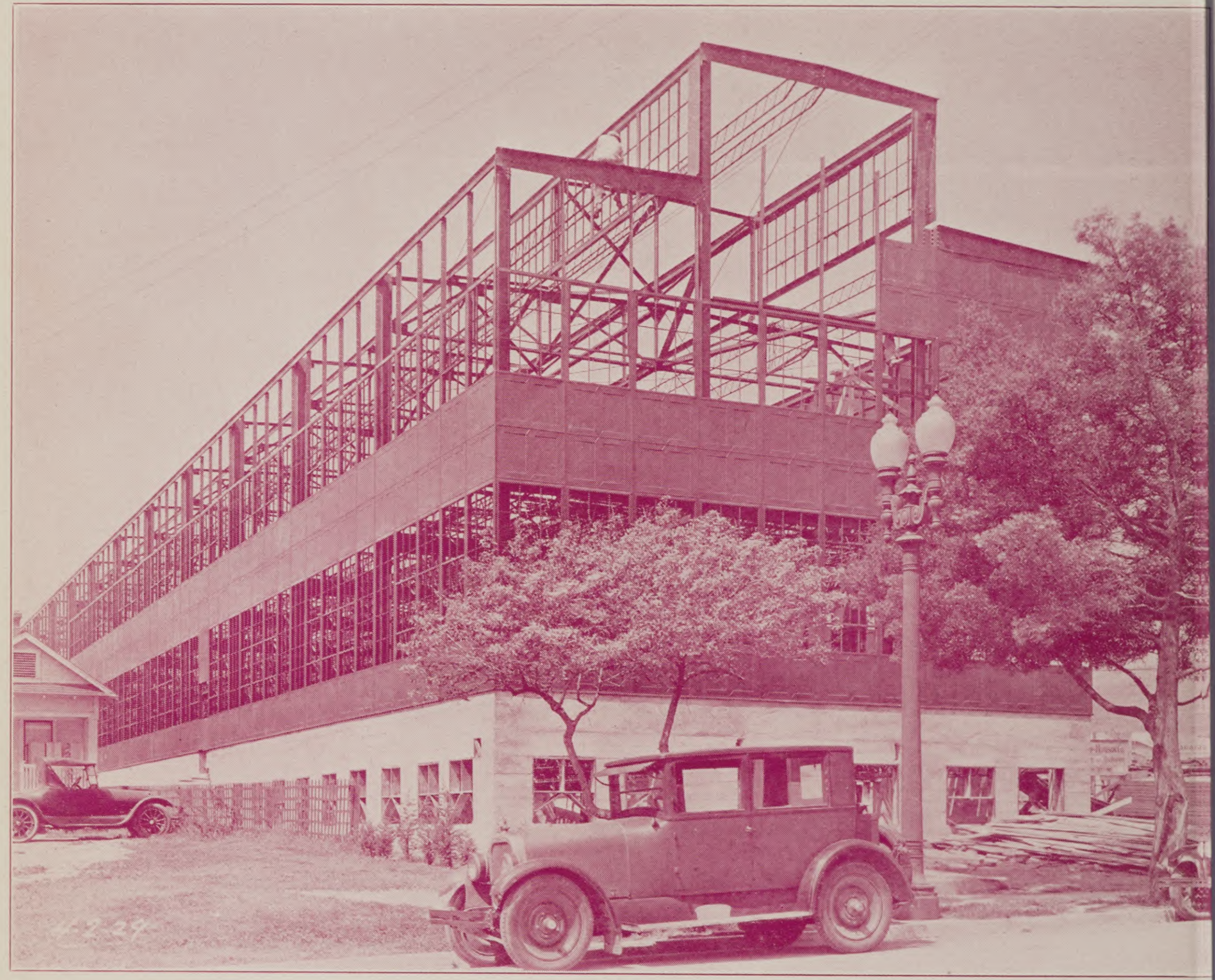

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